Railway Age Gazette

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY,
WOOLWORTH BUILDING, NEW YORK.

CHICAGO: Transportation Bldg. CLEVELAND: Citizens' Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico	$5.00
Canada	6.00
Foreign Countries (excepting daily editions)	8.00
Single Copies	15 cents each

Engineering and Maintenance of Way Edition and four Maintenance of Way Convention Daily issues, North America, $1.00; foreign, $2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

WE GUARANTEE, that of this issue 8,150 copies were printed; that of these 8,150 copies, 6,559 were mailed to regular paid subscribers and 348 were provided for counter and news companies' sales; that the total copies printed this year to date were 380,009—an average of 8,636 copies a week.

VOLUME 55. OCTOBER 31, 1913. NUMBER 18.

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*Illustrated.

CHAIRMAN CLARK summarized in a few sentences the most important phase of the railway situation when he said in his address before the National Association of Railway Commissioners on Tuesday: "An ideal transportation situation can be attained only by large additions to the facilities and great improvements in methods. The added facilities can be secured only through expenditures from surplus earnings or from expansion of credit. In either way the total cost to purchasers of transportation would be increased." It is difficult to comprehend how anyone who studies the statistics of earnings, of expenses, and of accidents of our railways, and who travels over them enough to be familiar with the physical condition of most of them can question the justice of Mr. Clark's summing up of the situation. Better facilities are needed to make the service of our railways as adequate as it should be, as good as it should be, and as safe as it should be. If earnings were increasing faster in proportion than the demands upon earnings we could rest satisfied that in due time the physical properties and the service rendered would be improved as much as the public welfare requires, but the demands on earnings are increasing faster in proportion than are the earnings. In these circumstances the ability of the railways to make necessary additions to, and improvements in their facilities is declining instead of increasing. It follows that if the service is to be improved its cost to those who buy it must, as Chairman Clark says, be increased. The question arises then as to whether it is better to continue to have poor service and lower rates. That question should not be hard to answer. Since the public needs better service and insists on having it, since it bitterly criticises the managements of the railways when the car supply is inadequate, or when railway accidents occur owing to defective track or equipment, the public should be willing to pay the price that it must pay in order to enable the railways to give the kind of service that it demands.

THE payment of tips is now so common in large cities that any one who attempts to stem the tide is to be credited with unusual grit; and the action taken at Portland, Oregon, asking passengers not to offer tips, which is noticed in another column is, therefore, an experiment of which every railroad officer will be interested to know the result. The things that can be said for and against tipping are so trite that we shall not weary the reader by repeating them; but in view of the apparent state of public opinion, and railroad officers' opinion, on the Pacific coast, the reader will be interested in the remark recently made by an officer of a large Eastern passenger station, that the porters in his station, when they carry a passenger's hand bag, are more likely to receive twenty-five cents than ten. The size of a tip is, indeed, quite commonly an important consideration. If it were possible to change our customs so that every passenger could, without embarrassment, pay, for carrying his baggage, a sum of money somewhere near what the service is really worth to him—as is more nearly the case in Europe—our whole problem would be very much altered.

"GET Rich Quick Wallingford" has nothing on that notorious exponent of efficiency who was designated in the September *Review of Reviews* as the "high priest of efficiency," whatever that may be, and who was quoted by Mr. Brandeis in the rate hearing a couple of years ago as authority for the statement that the railways could save a million dollars a day. Thousands of dollars have been spent in the popular magazines during the past few weeks advertising an Institute of Efficiency, which claims that its "course of 24 lessons [by mail] will save you years of preparation. It will give you the results of 40 years of experience. It is a short cut to business success." Some of these same magazines pride themselves on protecting their readers from unscrupulous advertisers. In bold lines above this statement in the advertisement in one of the magazines appear the words "$2,000 a month," which imply that the student who successfully completes the course will be in a position to command a big salary. A delightful picture to draw, but hardly fair for the poor chap who is not sufficiently well posted to realize its extravagance and who is of such an order of intelligence as to allow himself to be entrapped. In commenting on this feature the *Star-Telegram* of Fort Worth, Texas, says:

> Formerly men served an apprenticeship and worked half a lifetime to reach commanding positions and good salaries.
>
> Now the ambitious young man simply cuts a coupon out of the corner of an advertising page and writes for full instructions—paying a small sum of course as an evidence of good faith—and proceeds to take the business and industrial structure by the scruff and shake it into respectability and good form.

The head of the institution who "will personally supervise the whole course of instruction," is described as the man who first

made efficiency famous. "It was he who showed the railways how they could save a million dollars a day." Did he? Does anyone seriously think he could?

OUR contemporaries, the *Indianapolis News* and the *Omaha Bee*, have been discussing whether the decision of the Supreme Court of the United States in the Nebraska rate case has been overruled. It was in this case that the Supreme Court first laid down the principle that the true basis for the calculation of the reasonableness of railway rates was the fair value of the railway's property. The *Omaha Bee*, referring to the decision, says that it "indicated a method of computation decidedly favorable to the railroads," and both that paper and the *Indianapolis News* evidently hope that the precedent established in that case has been overruled. The view expressed by the *Omaha Bee*, namely, that the method of computation indicated by the Supreme Court in this case was decidedly favorable to the railroads, is one that is widely held. The truth is, however—and this is a fact almost entirely overlooked or ignored nowadays—that the method of computation referred to, when adopted by the court, was regarded as unfavorable to the railroads. In the Nebraska rate case the railways contended that the valuation should be based on the actual cost of their properties. Because of a decline in wages, prices and values all along the line following the panic of 1893, it was recognized that at that time the cost of reproducing the railways concerned would be less than their original cost. "In the cases before us, however," said the Circuit Court, "there is abundant testimony that the cost of reproducing these roads is less than the amount of the stock and bond account or the cost of construction, and that the present value of the property is not accurately represented by either the stocks and bonds or the original construction account." The Circuit Court held, however, that the investors in the railways had assumed the risks of investment, and that, therefore, if the present value of the properties was less than their original cost the investors must suffer. And the Supreme Court upheld this decision. Conditions changed subsequently. The wages of labor, the prices of materials and the value of railway land increased, and, in consequence, the time came when the cost of reproduction exceeded the cost of original construction. It is this change in condition which has converted the method of computation adopted by the court from one which was unfavorable to the railways to one which is favorable to them, and those who got this method of computation adopted are being hoist by their own petard. And now they begin to complain about it. But if the method was fair when it was unfavorable to the railways, why it is not fair when it has become favorable to them? Or is the public's attitude in regulating the railways to be one of "heads I win; tails you lose."

ON Monday of this week the Interstate Commerce Commission had a hearing on the new tentative form of annual report which it proposes to require from steam roads. The most radical change in the form of this report is the provision for showing separately operating expenses incurred in freight and passenger service. The commission has been working with the sub-committee of the American Railway Accounting Association for more than a year on changes in the form of annual report to the commission, and Commissioner Meyer, who is in charge of statistics has shown that it is his conviction that an attempt must be made to assign freight and passenger expenses. In the tentative report, which was considered on Monday, provision is made for showing separately expenses caused "solely by revenue freight service"; expenses caused "solely by revenue passenger service," and expenses caused by joint, common and miscellaneous service. It is left optional with the companies as to whether or not the common expense shall be allocated on some formula which they are left to work out. The point Commissioner Meyer makes is this: If the cost of service is one of the determining factors in rate making, even if it is only a minimum below which the commission may not without violating the Fourteenth Amendment reduce rates, it is the duty of the commission to try to get at that cost. In every case that comes before a court in which the commission's rates are attacked by a railroad company on the ground of confiscation, the railroads submit figures to show the cost of service. It was plainly apparent at the hearing that the commission believed that figures compiled to be submitted at a particular rate hearing are not based necessarily on sound accounting theory, but on a desire to win the particular case in hand, and that the commission has a right to ask for figures which are compiled on general principles and not in accordance with the expediency or necessities of a particular case. Of course, it is not difficult for railroad accounting officers to demonstrate the impossibility of accurately dividing all expenses as between freight and passenger service. Mr. Seger of the Union Pacific went so far as to claim that not a single expense, which a road doing both a passenger and a freight business incurs, is solely for revenue freight service or solely for revenue passenger service. He may be right theoretically, but the common sense of the commission is not apparently going to permit a theoretical hair-splitting objection, or even a great number of such objections to prevent them from making a beginning in the separation of expenses as between the two classes of service. One cannot blame the railroad companies for trying to avoid giving state commissions and irresponsible state legislatures ammunition with which to attack rates. On the other hand, it is an ostrich-like performance for the accounting officers to argue to the commission that no division of expenses can be made which will accurately show the cost of even freight service as a whole as distinguished from passenger service as a whole, while at the same time their own legal departments are fighting a rate reduction by the introduction of testimony to show a given rate on a given commodity is confiscatory. There may be some valid reasons why the assignable expenses should not be assigned in the annual reports to the commission, but these objections were not brought out at the hearing on Monday. Furthermore, if the commission really knows what it wants, it is going to get it, and a constructive criticism which will help the commission in getting figures which it wants will go much further toward preventing unnecessary expense to the railroad companies than will any amount of arguing about the theoretical impossibility of obtaining this information in a statistically pure and perfect form. It may be true that the original mistake was made by the railroad lawyers in laying so much stress on cost of service as a test of reasonableness but that is a mistake that cannot now very well be remedied.

THREE of the railroad brotherhoods at least were represented at the hearing on Monday, and they presented a strong plea that the form of annual report of the commission be changed so as to show the actual compensation received per month by each class of employees. Mr. Carter, in his effective, if somewhat bombastic, style, pointed out how misleading it was to lump firemen and hostlers together and to strike an average of their average wage. The representative of the Order of Railroad Clerks objected quite strongly to the lumping together of clerks and attendants. The points taken by the labor men were well made. In every wage controversy which has gone to arbitration the question of what compensation a specific class of employees are receiving is one of the disputed points and it should not be. Mr. Carter and the Bureau of Labor appeared to be anxious that the statistics relating to the wages paid railroad employees should be compiled by the Bureau of Labor and while undoubtedly the advice and assistance of the Bureau of Labor in formulating a system on which the roads are to report their wage expenses, will be of help to the commission, this matter lies clearly within the jurisdiction of the Interstate Commerce Commission. With the authority to regulate all the other accounts of the railroads and their rates, should go the responsibility of compiling the figures showing the wages paid by railroads. The English classification of expenses, crude as it is in some respects, separates every item as between wages and material. There is apparently no opposition on the part of the railroad officers to the sugges-

tions of labor people. The roads have nothing to lose and everything to gain by showing clearly what they are paying each class of employees. If, as a good many railroad men think, they are paying some classes too high, and others not high enough, it is a condition which public opinion if rightly informed will help them to correct.

APPOINTMENTS TO THE INTERSTATE COMMERCE COMMISSION.

COMMISSIONER PROUTY is to retire from the Interstate Commerce Commission to take direct charge of the valuation of common carriers which Congress has required the commission to make. The term of Commissioner Clements will expire on January 1. These developments will give President Wilson an opportunity to appoint two members of the commission. It is to be hoped that he will take advantage of it to put strong and fit men on that body, thereby refraining both from impairing its efficiency and from setting bad precedents for future appointments.

Those who understand the true functions of the commission, and appreciate their great importance and the difficulty of properly performing them, easily agree on the principal qualifications which an appointee to the commission should possess and the principal disqualifications which he should not possess. At a time like this, however, it is desirable that these qualifications and disqualifications shall be iterated and reiterated so that they may constantly be borne in mind.

One of the most essential qualifications is a judicial mind. No man who has not such a mind can approach the problems of the commission impartially; and no man who cannot approach those problems impartially is fit to be on the commission. Since a judicial mind, together with the impartial attitude which only a judicial mind can have, is one of the most fundamental qualifications of a member of the commission, it follows that the burden of proof rests very heavily, indeed, on any who may advocate the appointment to it of any man who is or has been an active politician. It is very unusual for the quality of being judicial and the qualities of a politician to be united in the same person. A politician is bound to be a partisan, and a partisan can hardly be judicial. Furthermore, the railway question has been in politics in this country continually for at least ten years. As it has been in politics it has been necessary for the men who have been active politicians to be active partisans either for or against the railroads. Therefore, an active politician under present conditions has the double disqualification that he probably has not a judical mind and that he probably has been and is a partisan on the railway question.

The politicians are already stirring to get one or more of their number appointed to the commission. Mr. Henshaw, who was formerly an agitator against the railways in Oklahoma, and who was elected a member of the Oklahoma Corporation Commission, is understood to be a candidate. So is Governor Glenn of North Carolina. It is inconceivable that President Wilson, appreciating, as he must, the need for men of a judicial mind on the commission, can seriously consider appointing Governor Glenn, Mr. Henshaw, or men of their type.

Another qualification which members of the commission ought to have when they are appointed is either a profound and comprehensive knowledge of railway and kindred problems acquired by study and investigation, or a practical working knowledge of railway problems and practices gained by experience. Seldom have the men elected or appointed to state commissions and the Interstate Commerce Commission possessed the qualification of either special knowledge or special experience. Many after appointment to state commissions and the Interstate Commission have become able and satisfactory regulating officials; but they have had to do years of work before they became so. As Chairman Clark has said in a recent letter, "It makes no difference how able a man may be it takes considerable time for him to fully comprehend the complications involved in efforts at rate regulation and the removal of unjust discriminations." The commission is now dealing not only with railway rates, but with railway operation; and it seems probable that it will deal with railway operation more in the future than it has in the past. Therefore, with every year that passes the folly involved in appointing to it men who have no special knowledge of, or experience in dealing with, railway problems grows greater.

A third, and the most important, qualification of a member of the Interstate Commerce Commission is that he shall be a man of sterling character. By this is not meant merely one who is law-abiding and moral. All members of the Interstate Commerce Commission are and have been that so far as we know. What is meant is that he shall be a man so big in intellect and personality that he will command the confidence and respect of shippers, of railway officers, and of the public. The nature of the work of the commission is such that the effect that will be produced by one of its opinions, or orders, or reports depends largely on the character of the man who is known to have been the author of it. If the commission is to serve its purpose with the maximum effectiveness and the maximum benefit to the public it must be composed of men who will not arouse the suspicion that they are biased, narrow, unfair, or more disposed to split the ears of the groundlings by sensational utterances or acts than to so regulate the railways of the country as to best promote the rightful interests of both the railways and the public.

The salary paid to members of the Interstate Commerce Commission is relatively small. Their duties are onerous. Nevertheless, if it be made known that membership on the commission is to be a position of honor and trust, that the commission is to be left as free from political influence in the performance of its duties as is the Supreme Court of the United States, and that a man who has once been appointed to it and has performed his duties faithfully and well may count on reappointment for an indefinite period, there will never be any difficulty in getting and keeping the right kind of men on the commission.

If the foregoing considerations be well-founded it follows that Commissioner Clements should be appointed his own successor. Mr. Clements has done and said some things which have been open to criticism. But the integrity of his character is unquestionable; he has had years of experience; he has much natural ability; and, therefore, he is better fitted for membership on the commission than almost anybody who might be appointed to supersede him. As to a successor to Commissioner Prouty, the President will have no difficulty in finding a suitable man once he has got clearly in mind the true qualifications of such a man. He can find men possessing the needful qualifications in the economists in our universities, from which came President Hadley to be chairman of the Railroad Securities Commission, and B. H. Meyer to sit on the Railroad Commission of Wisconsin and on the Interstate Commission itself. He can find them among the members of some of the appointive state railway commissions; but he will have very great difficulty in finding any of them among the members of the elective state railway commissions. He can find them among the traffic managers of the large industrial concerns of the country. He can find them among the traffic and operating officers of the railways. It may be thought that a traffic manager of a large industrial concern or a traffic or operating officer of a railway would be biased; but neither of them would be anywhere near as likely to be a narrow partisan as would some active politician, and both would be much more likely to have the special knowledge and experience which an appointee to the commission should have.

Let us hope that President Wilson in making the appointments will be guided by good counsel and wisdom; for the kind of appointments he makes to the commission may affect the material welfare of the country more than any other appointments that he may make while he is President.

INCREASING THE LOADING OF CARS.

ONE of the very best ways to increase the efficiency of railway operation is to increase the loading of cars. In no other way can the amount of traffic handled be increased with such small additions to fixed charges and operating expenses. It is well known that the capacity of freight cars has been augmented much more within recent years than the loads hauled. In consequence, the proportion of car capacity provided but not utilized has steadily increased. This involves economic waste to the railway, to the shipper and to the public. The smaller the number of tons hauled per car the greater is the cost of hauling each ton. When the cost of handling freight is made unnecessarily high, either the railway earns less net than it might, or the shipper is charged higher rates than would otherwise be necessary, or both of these results follow. If the average carload were increased the resulting benefits might be divided between the railway and the shipper, the one enjoying somewhat larger net earnings than he otherwise could, and the other enjoying somewhat lower rates than he otherwise could. Since heavier loading could be made to work advantageously to both the railway and shipper, it is an end toward the attainment of which it is obvious that they might beneficially co-operate.

It is gratifying and significant that it is a shipper who recently has called attention most forcibly to the desirability of heavier loading of cars. J. F. Townsend, traffic manager of the National Tube Company, has given publicity to figures regarding the results of a campaign for heavier loading of cars which has been carried on by the constituent companies of the United States Steel Corporation. Mr. Townsend says:

> A comparative statement of the average carload of outbound traffic for the years 1911 and 1912 for the American Bridge Company, American Sheet & Tin Plate Company, American Steel & Wire Company, Carnegie Steel Company, H. C. Frick Coke Company, Illinois Steel Company, National Tube Company, Pittsburgh Steamship Company, Tennessee Coal, Iron & Railroad Company, and Universal Portland Cement Company, produces the following result: During the year 1911 the average carload was 34.6 tons, and for the year 1912 the average carload was 36.2, or an increase of 1.6 tons per carload. This increase of 3,200 lbs. to the average carload on outbound shipments means there were 76,105 fewer cars used to handle an equal tonnage as compared with the average carload of the year 1911, based on the outbound traffic of the above ten companies.
>
> Both the shippers and the railroads have been benefited to almost an immeasurable extent in the switching and weighing avoided, i. e., the great saving in operating expenses; switching service on 76,105 cars or 152,210 terminal movements, and the expense of handling this additional number of both empties and loads through the various classification or interchange yards of the railroads from point of shipment to destination. Figure this in any manner that you may, it will prove conclusively the money value of conserving the freight car equipment, not only when there is a severe car famine, but at all times. To illustrate: One company saved 122 cars by loading only 100 lbs. heavier per car during the year 1912. The record of another company emphasizes the importance of heavier loading perhaps more than any other example, for even with only 400 lbs. per car increase on its traffic means that 15,836 fewer cars were required to move the same tonnage.

Continuing, Mr. Townsend calls attention to what the shippers of the Pittsburgh district alone could do to add to the car supply. He says that an increase in the average carload originating in the Pittsburgh district in 1912 equivalent to that secured by the United States Steel Corporation, namely, from 34 to 36 tons, would have resulted in the tonnage originating in this district being carried in 409,520 less cars. Assuming an average haul of 100 miles, he computes that the saving in car mileage would have been 40,952,400 car miles.

Another article on the same general subject was published in the *Traffic World* for October 18, and signed by "Co-operation." We surmise from its tone and substance that it also was written by Mr. Townsend. In it the writer presents forcibly the advantages in the way of greater economy and more adequate car supply that might be gained by both the railway and the shipper from better loading. We publish elsewhere in this issue an article on this subject by Gordon Wilson.

It would be easy to increase the average loading if the railways could raise their minimum carload weights. They have made many such raises within recent years, but every time there is an attempt to make a substantial advance serious difficulties are encountered. While shippers generally would benefit, at least through the reduction or abolition of car shortages which would result, there are many individual small shippers who are injured by advances in minimum weights. Being unable to load the minimums required they find it necessary to pay for an entire car when they cannot use it all, or to pay the less than carload rates. This is a very serious matter, for it is not to the interest of the railway or the public to have the small shipper placed at any disadvantage as compared with the large shipper if any reasonable means can be adopted to avoid it.

"Co-operation" suggests as an alternative for flat advances in carload minimums the adoption of a system of graduated carload minimums. In other words, he would apply one rate per 100 lbs. on less than carloads, a lower rate per 100 lbs. for a load of 20,000 lbs., a still lower rate per 100 lbs. for 60,000 lbs., and still lower rates for 80,000 lbs., 100,000 lbs., etc. As he points out, the equivalents of a system of graduated carload rates are in effect on the railways of Europe. In England lower rates are made for 2-ton and 4-ton lots than for goods moving in smaller quantities. On the German state railways lower rates are made for 5-ton lots than for smaller shipments, and for 10-ton lots than for 5-ton lots, a 10-ton lot in Germany being regarded as a carload.

The suggestion that graduated minimum weights could be advantageously adopted by the railways of this country merits the most serious consideration. In fact, it has been considered by some very eminent and practical railway traffic officials, but most of them have feared to advocate it lest they might be criticized as "theorists." It seems highly probable that if the best minds of the railways and the industrial and commercial interests should investigate the subject in a co-operative and constructive spirit some comprehensive plan could be worked out that would be mutually advantageous to them and also of great public benefit. The fact is, that the carload, and not the ton, is the true unit of cost in freight transportation, and it makes very little difference what the rate for 100 lbs. or per ton is if the earnings per car mile are satisfactory. A railway had a great deal better have coal traffic which will move in carloads of 100,000 lbs. at 4 mills per ton mile than dry goods that will move in carloads of only 15,000 lbs. at a rate of 2 cents per ton mile. In the former case the earnings per car mile will be 20 cents; in the latter case only 15 cents. A railway may get rich hauling coal in large quantities at 4 mills per ton mile; but it will hardly get rich hauling dry goods at a rate several times as high. This simple illustration suggests how vitally important it is to use every resource to secure the heaviest practicable loading of cars.

The subject of minimum weights has always been handled by the traffic department of the railroads. It is both a traffic and an operating problem. The rate per ton mile charged ought to be related to the minimum weight, and rates are a traffic matter. On the minimum weights applied will largely depend the average loading per car secured; on the loading secured will largely depend the economy of operation; and economy of operation is an operating matter. Therefore, it would seem that the operating and traffic departments might well appoint a joint committee to take up with a committee representing the shipping interests of the country the problem of securing heavier loading of cars in all of its phases. This matter is one to which the American Railway Association might very well give attention when it meets in Chicago next month. Undoubtedly the railways alone could do much to increase the loading of cars; but to secure the greatest practicable results they must have the co-operation of the shippers; and in order to secure the co-operation of the shippers they must make it worth the while of the shippers to co-operate.

ATCHISON, TOPEKA & SANTA FE.

THE Atchison, Topeka & Santa Fe is in many respects typical of the better managed railroads of the West. Operating 10,750 miles of road, it earns between ten and eleven thousand dollars per mile. It operates on about a 66 per cent. basis, and within the system are comprised all the varieties of western railroad conditions. It has its heavy traffic density main lines built with the highest modern standards and worked most of the time close to capacity. It also has lines on which there is almost no local traffic but with heavy through business, which, in their present condition, are also being worked about to capacity. In addition it has its full share of branch line mileage on which the present service is probably more adequate than could be justified entirely by present earning capacity.

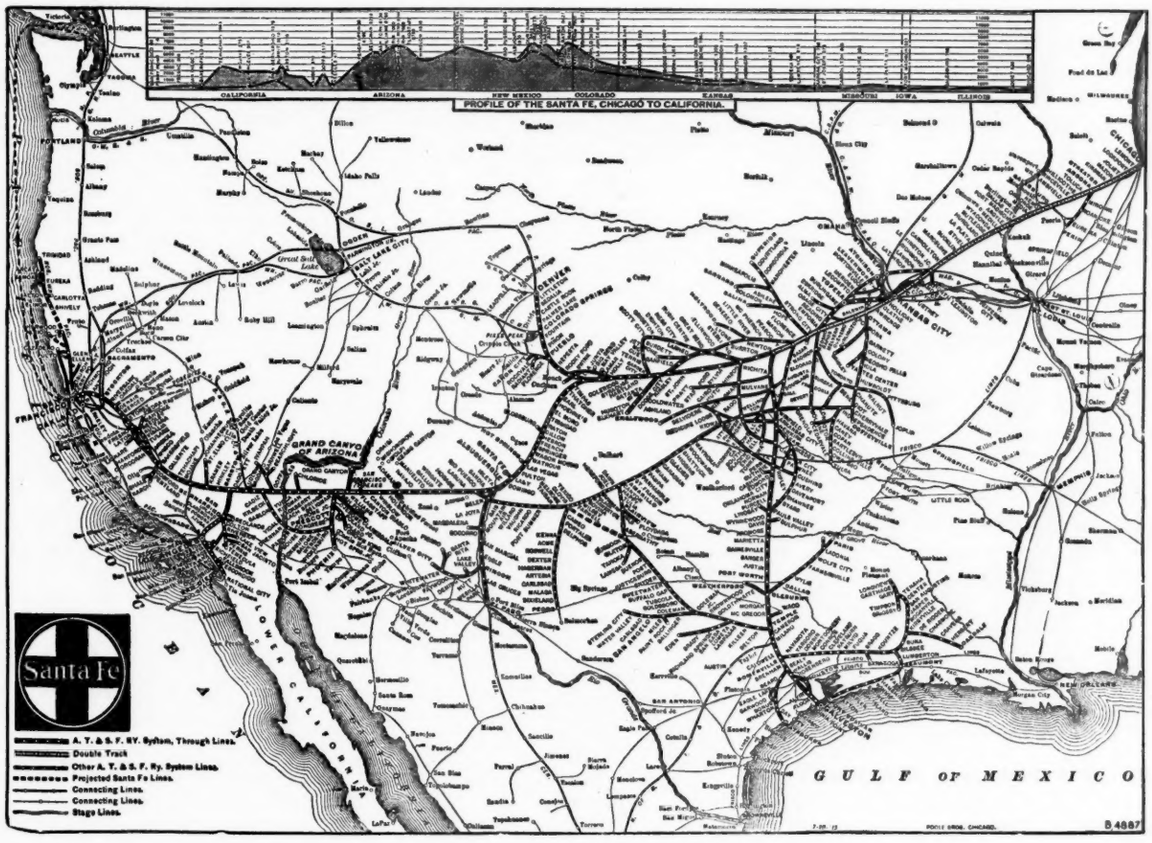
In 1913 total operating revenue amounted to $116,900,000, which is the largest revenue in the history of the company and is greater than the 1912 revenue by more than $9,000,000. On the other hand, expenses amounted to $77,640,000, or about $6,400,000 more than in 1912, and of the increase, all but about $1,400,000 was in maintenance. The table at the end of these remarks shows in more detail the operations in 1913 as compared with 1912, and it will be noted that although the company had a surplus, after the payment of dividends, of about $6,000,000 in 1913, as compared with less than $4,000,000 in 1912, all of this surplus in 1913 as well as in 1912 was put into the property as further capital investment. In all there was $18,394,000 additional investment made in the property in 1913.

The Atchison is a conservatively capitalized property with an unusually high credit. It passed through a receivership in 1896 and since then has been both well managed and conservatively financed. The fact that control is held by no one group of capitalists; that its securities are widely distributed among comparatively small investors; that the price of its securities has never been open to the suspicion of being juggled; and that it has been managed solely in the interest of all the security holders, has made the Atchison credit high and on an unusually broad stable base.

The property has not, like the Southern Pacific, had a long unbroken record of huge amounts of money taken from profit and put in as further investment; but the Southern Pacific is not typical of American railroads any more than the Delaware, Lackawanna & Western is.

The operating gains in the effective use of the plant have not been as striking over a series of years on the Santa Fe as they have on the Southern Pacific. The average train load in 1912 on the Santa Fe, including company freight, was 400 tons. This is an increase over 1908 of 6 per cent., and compares with an average train load on the Southern Pacific of 456 tons, in the strike year 1912, an increase over 1908 of 13 per cent. On the other hand, the gains made on the Santa Fe in 1913 over 1912 are particularly good. The average train load was over 6 per cent. greater in 1913 than in 1912. Car loading increased 3.24 per cent.; and while total ton mileage of freight increased 9.03 per cent., freight car mileage increased 5.49 per cent., and freight and mixed train mileage 2.50 per cent. The Santa Fe has always stood for progress, although possibly at times this progress took the form of experiment, which was not wholly successful. If one could spend two or three days with every superintendent on the Santa Fe it is not too much to say that he would get an almost overwhelming idea of the needs of the property. It is characteristic of American railroad superintendents to always keep a pet project or two ahead for their division; but on the Santa Fe these pet projects for betterments have been accumulating for years, notwithstanding the fact that very large sums have been and are being spent for betterments that cannot be postponed. In other words, high as has been the standard of maintenance and large as have been the capital expenditures these latter have not been large enough.

President Ripley strikes a solemn note of warning in the Atchison report for the fiscal year ended June 30, 1913, which



The Atchison, Topeka & Santa Fe.

is well worth the most serious consideration. Mr. Ripley says:

"The growth of the business of your company, and also the increased efficiency are due principally to the very large expenditures (over $270,000,000) which have been made in the extension and improvement of the property since January 1, 1896. In order to make such expenditures your company has raised since 1896 over $217,000,000 of "new money" by the sale of bonds which are now outstanding or which (in the case of many of the convertible bonds issued) are represented by common stock now outstanding. The following statement shows, for each year, the amount of investment, the amount of net income applicable to bond interest, dividends, improvement of property and strengthening of credit, and the rate of return which such net income represents on the amount of the investment.

Year ending June 30th.	Property Investment.*	Income applicable to bond interest, dividends, improvement of property and strengthening of credit.†	Per cent. Income of Property Investment.
1896 (6 months)	$372,104,262.77	$2,432,870.06	.65
1897	387,957,477.68	6,070,364.45	1.57
1898	392,169,842.02	8,871,947.26	2.26
1899	399,527,444.30	11,409,315.36	2.86
1900	407,187,811.22	17,064,850.91	4.19
1901	419,541,440.17	21,196,714.38	5.05
1902	439,911,035.33	23,921,018.14	5.44
1903	454,290,057.89	23,032,814.51	5.07
1904	466,273,139.34	24,778,541.31	5.31
1905	473,020,998.79	21,353,856.15	4.51
1906	496,782,342.35	28,355,393.34	5.71
1907	519,004,129.48	32,724,274.07	6.31
1908	541,727,328.96	25,633,510.34	4.73
1909	548,251,270.97	33,523,437.28	6.11
1910	579,793,768.23	32,387,712.39	5.58
1911	609,287,764.18	34,102,511.86	5.59
1912	621,869,989.29	33,321,100.75	5.36
1913	640,263,756.10	36,086,013.36	5.64
Annual average	$487,164,658.84	$23,786,642.62	4.88

*The amounts above shown as "Property Investment" do not include anything for necessary working capital such as materials and supplies and cash. Ordinarily such necessary working capital considerably exceeds $35,000,000.

In the years 1901 to 1908 the "Property Investment" was reduced by "writing off" sums aggregating $21,066,685.78, which sums are excluded from the "Property Investment" as above stated.

In the years 1910 to 1913 sums aggregating $16,077,421.48, consisting of depreciation of equipment accrued pursuant to the ruling of the Interstate Commerce Commission, have been deducted from the amounts shown as "Property Investment" and are excluded in the above statement.

†The "Income" shown above is determined after allowing for adjustments made through profit and loss.

"The last statement emphasizes the striking fact that the earnings on the entire investment are now not much in excess of 5 per cent. per annum and continue on that basis notwithstanding the increase in efficiency and the increase in the volume of traffic. It may be explained that the ability of your company under such circumstances to pay 6 per cent. on the common stock is due to the fact that it pays an average of substantially less than 5 per cent. on its bonded debt, and, indeed, much of the bonded debt was created when money could be borrowed at or near 4 per cent.

"The very moderate return which is realized upon the investment, especially when considered in connection with the increased rates which must now be paid for new capital, indicates that in order to preserve and strengthen the credit of even the most successful railroad companies, to the end that they may be able to develop and improve their property so as to promote the public safety and the public convenience, the government ought to increase, rather than to reduce still further, the rates for transportation and ought to be exceedingly slow about increasing still further the costs of operation. It is very clear from the foregoing statement that the mere growth of business and the mere increase in efficiency will not afford adequate protection against further reductions in rates for transportation and further increases in costs, especially in view of the increasing rates demanded for the use of money."

A warning such as this, coming from the president of one of the greatest American railroad systems, who represents no group of capitalists; who has no interests but the interests of his company, its security holders and its patrons to serve; who has managed this great property in such a way that Atchison credit abroad has a reputation enjoyed by few other American railroads, and in such a way that Santa Fe passenger service is known pretty well all over the world, merits a very careful consideration both by the Interstate Commerce Commission and by the president of the United States.

The Atchison is in a strong position as regards cash. There are no bills or loans payable and the company has on hand $30,096,000 cash.

The following table shows the principal figures for operation in 1913 as compared with 1912:

	1913.	1912.
Average mileage operated	10,750	10,628
Freight revenue	$78,190,923	$71,629,575
Passenger revenue	29,425,922	27,453,525
Total operating revenues	116,896,252	107,752,360
Maint. of way and structures	18,054,413	16,076,834
Maint. of equipment	19,415,225	16,521,231
Traffic expenses	2,455,785	2,416,746
Transportation expenses	35,135,649	33,733,667
General expenses	2,581,463	2,524,724
Total operating expenses	77,642,535	71,273,203
Taxes	4,662,152	4,206,454
Operating income	34,591,565	32,272,703
Gross income	37,107,189	34,842,671
Net income	22,153,734	19,660,241
Dividends	16,107,470	15,876,875
Appropriations for additions and betterments	5,574,434	3,300,000
Fuel reserve	461,105	396,960

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.

THE Minneapolis, St. Paul & Sault Ste. Marie, which is controlled by the Canadian Pacific and which itself owns the majority stock of the Wisconsin Central and operates this property as its Chicago division, earned gross in 1913 $32,300,000, by far the largest earnings in the company's history. Of these total earnings $21,410,000 was earned on the Soo proper and $10,890,000 on the Chicago division. This is a gain over 1912 of $4,300,000 on the Soo and $1,300,000 on the Chicago division. The Soo earned in 1913 $7,344 per mile, and the Chicago division $9,887 per mile, and the properties are operated on a 56.5 and 66.2 per cent. basis respectively.

The Soo runs through a country that is largely dependent on railroad facilities for its development, and the company has in the past pursued a liberal policy of extension as well as betterment. At present, however, the company is simply completing the work of extension that it had mapped out some years before and cannot interest capital in any further plans for extension. This is in marked contrast to the situation in Canada, where roads which the country needs, or thinks it needs, are being built so largely with government aid in the shape of guarantees, land grants, or otherwise.

The Soo itself has had much the same experience in regard to expenses as other roads in the United States. Both maintenance of way and maintenance of equipment charges were made more liberally in 1913 because of larger business and more revenue with which to meet them, as well as, of course, greater wear and tear on the plant due to the larger business handled. Transportation expenses in 1913 amounted to $6,090,000 on the Soo as against $4,990,000 in 1912, and on the Wisconsin Central to $4,010,000 as compared with $3,700,000 in 1912. On the Soo 2,073,000,000 ton miles were carried in 1913, as against 1,653,000,000 in 1912. The average haul was just about the same in 1913 as in 1912, 267 miles. With this increase in freight traffic and an increase in the number of passengers carried one mile from 169,000,000 in 1912 to 198,000,000 in 1913, there was an increase in the total revenue locomotive mileage of about 1,300,000; the total in 1913 of revenue locomotive mileage being 9,639,000.

Both the Soo and its Chicago line have heavy freight train loading for granger roads, and the Soo especially made a large gain in 1913 over 1912. The freight train load in 1913 on the Soo was 422 tons as compared with 396 tons the year before, and on the Chicago division the train load in 1913 was 470 tons as against 446 tons the year before. Car loading also was better in 1913 on the Soo, the average per loaded car being 18.18 tons in 1912 and 19.23 tons in 1913.

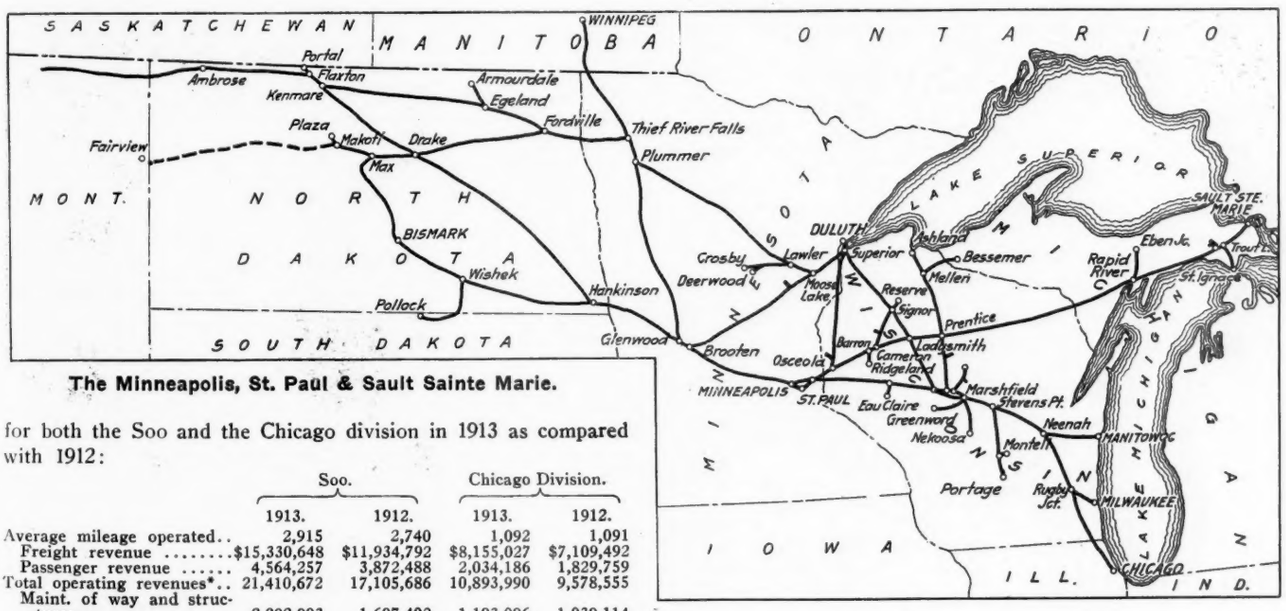
The changes in the tonnage of various commodities carried on the Soo speak eloquently of the development of the territory. In 1911 36.11 per cent. of the total tonnage was lumber, as against 27.43

per cent. in 1913, while on the other hand the percentage of grain in 1911 was 12.52 per cent., as against 23.25 per cent. in 1913; and whereas the tonnage of miscellaneous carload business was 384,000 tons, or 7.66 per cent. of the total in 1911, this had increased in 1913 to 719,900 tons, or a total of 9.28 per cent. of all revenue tonnage. Neither the Soo nor its Chicago line carries much coal; but the Chicago division in 1913 handled 1,227,000 tons of ore. In 1911 ore furnished but 12.52 per cent. of the total tonnage, while in 1913 this business has grown until it averaged 1,227,000 tons, or 18.09 per cent. of its total tonnage. Both the Soo and its Chicago line get fair but not large ton mile receipts. In 1913 the Soo got 7.40 mills, comparing with 7.22 mills in 1912. The Chicago division handled 1,260,000,000 ton miles, an increase of 19 per cent.; the average receipts being 6.47 mills as against 6.70 mills in 1912.

President Pennington calls attention to the development of the Cuyuna iron range. The first shipments on the branch running into this territory were in 1912, and in that year about 300,000 tons of ore were shipped. This year about 1,000,000 tons have been shipped, and the present prospects are for a shipment in the fiscal year ending June 30, 1914, of 3,000,000 tons or over.

The balance sheets of both companies (they are not combined in the annual report) show no loans and bills payable, and the Soo has on hand $3,357,000 cash, and the Wisconsin Central $1,336,000.

The following table shows the principal figures for operation for both the Soo and the Chicago division in 1913 as compared with 1912:



The Minneapolis, St. Paul & Sault Sainte Marie.

	Soo.		Chicago Division.	
	1913.	1912.	1913.	1912.
Average mileage operated..	2,915	2,740	1,092	1,091
Freight revenue $15,330,648	$11,934,792	$8,155,027	$7,109,492	
Passenger revenue	4,564,257	3,872,488	2,034,186	1,829,759
Total operating revenues*..	21,410,672	17,105,686	10,893,990	9,578,555
Maint. of way and structures	2,292,993	1,697,402	1,193,096	1,039,114
Maint. of equipment.....	2,603,669	2,027,240	1,375,307	1,322,066
Traffic expenses	357,518	295,361	289,537	268,216
Transportation expenses..	6,090,411	4,985,876	4,005,944	3,696,601
General expenses	458,418	336,565	224,364	214,288
Total operating expenses*..	12,096,215	9,586,408	7,208,299	6,836,883
Taxes	1,298,967	1,123,136	465,157	418,781
Operating income	8,015,490	6,396,142	3,220,535	2,522,891
Gross income	8,886,541	7,454,378	3,269,573	2,563,675
Net income	5,527,415	4,224,290	1,093,350	504,650
Dividends	2,646,714	2,417,037	450,688	225,344
Surplus	2,880,701	1,807,253	642,662	279,306

*This includes outside operations.

NEW BOOKS.

Transformer Practice. By William T. Taylor. Size, 9 in. x 12 in. 278 pages. 190 illustrations. Cloth binding. Published by the McGraw-Hill Co., New York. Price $2.50.

The first edition of "Transformer Practice" was published in 1908, and treated principally of the connection, installation and operation of transformers. The second edition, which has just appeared, has been entirely rewritten and enlarged with a view to keeping the book up-to-date in all methods of handling transformers and static induction apparatus. The book is particularly intended to help operating engineers to solve certain difficulties by the use of temporary arrangements when the proper apparatus is lacking.

Wright on Building Arbitrations. By G. Alexander Wright. Size 6 in. x 9 in., 48 pages, paper cover. Published by the author, at 571 California street, San Francisco, Cal. Price, $1.

A manual under the above title was published by Mr. Wright in May, 1894, and the present pamphlet is an elaboration of this earlier work, including data of interest to building arbitrators and a number of forms for their use. The principles of arbitration are set forth in the book and the statutory requirements necessary to the proper conduct of the duties of arbitrator or umpire are explained.

The Strength of I-Beams in Flexure. By Herbert F. Moore. Bulletin No. 68, University of Illinois Engineering Experiment Station. Size 6 in. x 9 in., 40 pages, 15 illustrations, paper bound. Copies may be secured upon application to C. R. Richards, acting director of the Engineering Experiment Station, Urbana, Ill.

Although it is customary in deriving the formulae for determining the load carrying capacity of I-beams under transverse loads, to consider only direct flexural action, it is known that such beams are also subject to sidewise buckling and web stresses which may materially influence failure. Very few transverse tests of I-beams have been made and little definite information has been at hand as to the action of beams under such stresses. Bulletin No. 68 discusses and tabulates the results of tests of I-beams at the University of Illinois and elsewhere with particular reference to these secondary effects. The conclusion is drawn that in considering the strength of beams in flexure the yield-point of the material should be regarded as the ultimate fiber stress for the beam. Suggested formulae are included for calculating the strength against sidewise buckling and against web failure.

Diagram Giving Stresses in Beams. By G. R. Thayer, Assistant Professor of Structural Design, Carnegie Institute of Technology. Size 7½ in. x 11½ in. Published by D. Van Nostrand Co., New York. Price, 20 cents.

A compact diagram for use in designing beams such as that prepared by Mr. Thayer should be found serviceable in many designing offices. The technical man often finds such a table a time saver, and by its use the non-technical man may obtain satisfactory results. It is intended to show the required dimensions of a beam for given loads and stresses, or for given moments and stresses; the section modulus required for given loadings, and stresses and the stresses caused in a given beam by a given load or by a given moment.

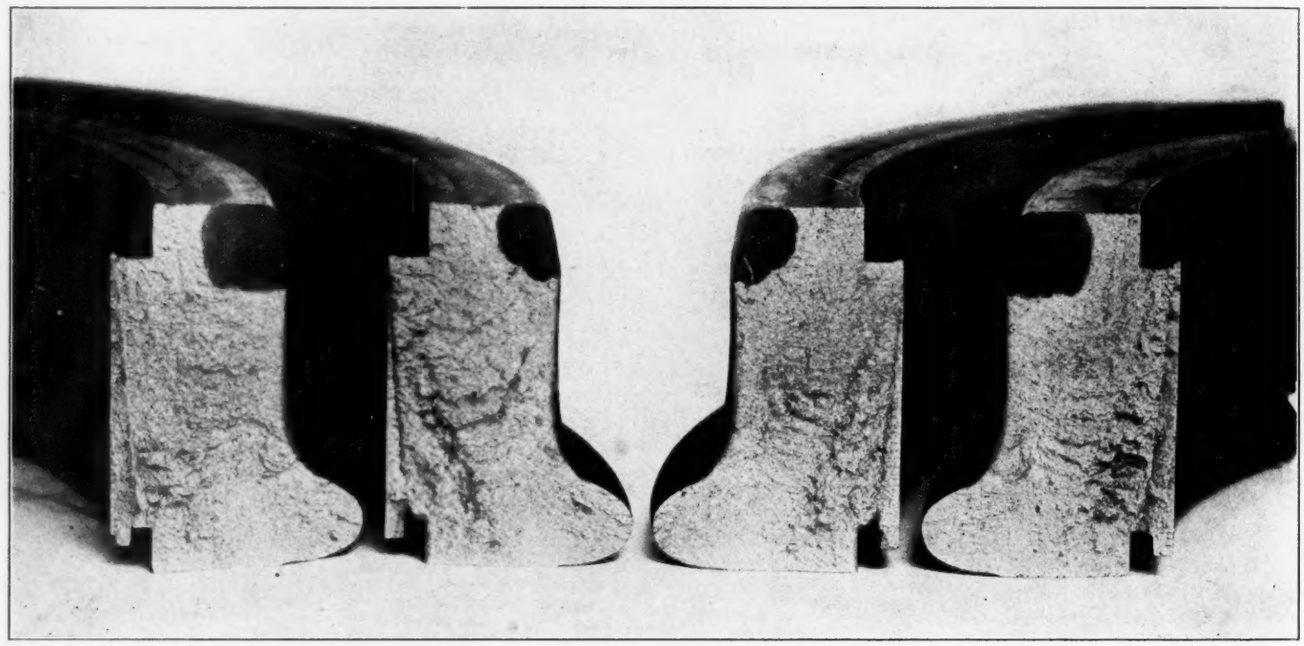
WRECK CAUSED BY A BROKEN TIRE.

Fracture Caused by Thermal Cracks Which Developed in the Tread; Extracts from Report of the Bureau of Standards.

On January 7, 1913, there was a derailment of a passenger train on the Cleveland, Cincinnati, Chicago & St. Louis, near Stockwell, Ind., resulting in the death of 1 passenger and the injury of 66 passengers and 4 employees.

The investigation of this accident disclosed the fact that it was caused by a broken tire on one of the wheels of the forward truck of the baggage car, the second car from the locomotive, and arrangements were made with the Bureau of Standards, of the Department of Commerce, to have the broken tire examined for the purpose of ascertaining the cause of its breakage; this examination was conducted by James E. Howard. The following is extracted from Mr. Howard's report:

The train consisted of a locomotive and seven cars, and was proceeding from Cincinnati to Chicago. Six cars of the train were derailed, the locomotive and the mail car remaining on the track uninjured, the damage to the train and the track occurring behind them. The baggage car, which was the second car in the train, was derailed to the right side of the track, turned end for end and faced toward the rear, and came to rest in a demolished condition. Its forward truck was five rail lengths to the rear, and also turned nearly end for end. The train was running at 55 or 60 miles an hour when the derailment occurred.



Thermal Cracks Which Developed in the Tire While in Service.

The character of the fracture in the tire was such that, while it is believed to have been the extension of a thermal crack previously existing, its development by stresses in the track and complete separation would take place very promptly when the final stage was reached. The shrinkage of the tire upon the wheel center was the chief element of strength, or resistance, which kept it in place when intact. When fractured this resistance was lost, and only the strength of the rivets of the retaining rings would then be available for holding it in place. The original thickness of the tire was 3⅛ in. and it was 2 9/16 in. thick at the time of derailment. The total mileage made was 111,113 miles; the car was in the shop in March, 1912, and the tires were then trued up. The contour lines were satisfactory at the time of derailment and it was not very much worn.

Eight 9/16 in. rivets were provided in the construction of the wheel to hold the tire against such an emergency as arose when this tire fractured. The total sectional area of these eight rivets was a little less than 2 sq. in. The two retaining rings, however, had a sectional area of about 60 sq. in. to resist an outward radial force taken either in tension on the body of the rings or shear of the inner lips. The tire was placed on the wheel center under shrinkage strains reported to range from one-eightieth inch to one-sixtieth inch per foot of diameter. The manufacturers heated the tire to a temperature of 450 deg. F., a very moderate heat in no way calculated to impair the properties of the steel, yet sufficiently high to permit assembling.

Under the maximum shrinkage above mentioned tires having the tensile properties of this one would not be strained up to their elastic limits when assembled. Shrinkage strains, however, are variable factors under service conditions. They would change as the tire becomes worn. Cold rolling of the metal at the tread would have a tendency to modify the strains. The greatest factor in the case, however, is the application of the brakes. The tread is suddenly heated by the friction of the brake shoe and the tire expanded before the center is affected, no doubt causing wide fluctuations in the magnitude of the shrinkage strains.

Momentarily the tire may be left with very little shrinkage resistance when there is sudden application of the brakes, causing the tire to reach a high temperature before the wheel center becomes heated by conductivity. An increase in temperature of only 214 deg. above the temperature of the center should relieve the tire of a shrinkage of one-sixtieth inch per foot. At the immediate surface of the treads much higher temperatures are reached. Superficially the temperature is such as to throw off a shower of sparks between the tire and the brake shoe. The brake shoes are not infrequently heated until portions reach a blue color. Inter-

mittantly the shrinkage strains of tires must pass through wide fluctuations.

But the sudden heating of the treads of wheels and the attainment of high temperatures assume a more serious aspect than causing the temporary reduction of shrinkage resistance. Thermal cracks in the steel are formed in this manner, the presence of which is a menace to the integrity of the tire. Such thermal cracks are probably present in all brake shoes after they have been but a few hours in service. Occasionally thermal cracks are developed on the running surface of rails and are there known as "wheel burns." They are caused by the rapid cooling of intensely heated metal, where free contraction is resisted. They result from internal

Thermal Cracks on Face of Tire at Outer Edge of Tread.

strains of tension, the metal passing through a reversal of internal strains in their formation. The present tire exhibited on its tread many such thermal cracks, leading to the belief that the complete fracture of the tire was the direct consequence of their being present. One of the illustrations shows the outer end of the tire on which a number of cracks of pronounced size were visible. The location of those which measured one-half inch or more in length, 21 in number, is indicated by chalk marks. These cracks are shown again in the other illustrations. The outer edge of the tread is shown, on which appear a number of the longer cracks between which are numerous small ones. The wider and longer cracks were conspicuous, admitting of discovery upon inspection of the tire. Such cracks in steel have grave significance. They lead to early ultimate failure, especially when the causes which occasioned their formation are aided and combined with independent straining forces. The shrinkage strains are always present in the cold tire, and they alone would have a tendency to complete the fracture of the tire when a thermal crack had reached a certain stage of development.

Thermal cracks are usually progressive in their character, but the rate of their development, a question of deep interest in the case of a tire, does not admit of a definite answer. The depth to which they have penetrated the metal is uncertain. A risk is assumed in running a wheel of this type in which there are thermal cracks. A more satisfactory solution of the problem than judging of the degree of risk involved and reaching a decision as to when to remove from service a wheel of this type in which thermal cracks have appeared would be a modification of the design of the wheel to the end that the element of safety is more amply provided for at a time when the shrinkage resistance between the tire and the wheel center is menaced.

Tensile tests and chemical analyses were made of the metal of this tire. One test piece was taken out in a radial direction, three test pieces tangentially; diameter of stems, 0.564 in.

Tensile Tests.

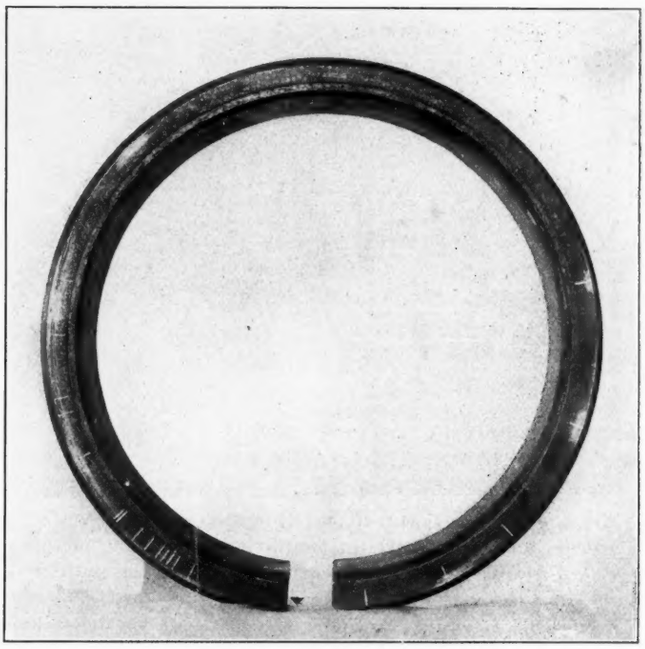
Mark.	Location.	Elastic limit per square inch (approximate).	Tensile strength per square inch.
		Pounds.	*Pounds.*
A	Longitudinal, middle of tire	.....	110,400
B	Tangential, flange	46,000	115,440
C	Tangential, middle, flange end	49,600	114,400
D	Tangential, outside end, 1 in. in from tread	.....	34,000

Mark.	Elongation. *Per cent.*	Contraction of area. *Per cent.*	Appearance of fracture.
A	5.5	4.8	Fine granular.
B	15.3	18.4	Fine granular.
C	12.7	18.4	Fine granular.
D	None	None	Fractured at a thermal crack; 40 per cent. of surface discolored, 60 per cent. fine granular.

It appeared from the discolored portion of the fractured surface of specimen D that the thermal crack in the tire at the location of this specimen had penetrated the tire to a depth of 0.9 in.

Chemical Analyses.

Mark.	Carbon.	Sulphur.	Phosphorus.	Manganese.	Silicon.
A	0.67	0.034	0.039	0.63	0.249
B	.70	.033	.043	.68	.254
C	.67	.026	.031	.67	.256
D	.65	.024	.041	.65	.255



Broken Tire with Thermal Cracks ½ in. or More in Length Indicated by Chalk Marks.

The chips for chemical analysis came from the metal of the stems in turning the tensile specimens.

A further examination was made of the tire for the purpose of ascertaining the depth to which some of the thermal cracks had penetrated the metal. It was cut apart in a slotter, for convenience, and fractures made in two places by bending stresses, the surface of the tread being on the tension side of the bend. The cracks opened slightly, then fracture suddenly took place across the full section. Another of the il-

lustrations shows the progress which the cracks had made, while the tire was still in service, toward its ultimate complete fracture. Sections measuring 1⅛ in. x ⅞ in. and 1¼ in. x 1¼ in., respectively, which appear dark-colored on the engraving, mark the extent of these thermal cracks. They had reached nearly half through the thickness of the tire. The gravity of the case is well illustrated in the discolored portions of these surfaces. A series of photographic prints of this kind could properly be placed before car inspectors for their information and guidance.

Methods of inspection may need revision to meet current conditions of railway service, wherein is shown a marked tendency to increase the working stresses, and in so doing decrease the margin in strength remaining between them and the rupturing loads of the materials. Inspection for the discovery of occasional structural defects and inspection for noting approach to the limit of endurance of materials are quite distinct problems, the latter presenting great difficulties. High wheel loads and the introduction of high-speed brakes are factors in the present case.

The prevalence of thermal cracks in brake shoes is a conspicuous feature. They are present commonly, if not invariably, in shoes, even those which have been but a short time in service. The conditions of exposure are the same, for the time being, for the rubbing surfaces of the shoe and the tire. The same tendencies necessarily exist for the formation of thermal cracks in each, but more accentuated in the shoe.

In conclusion, it appears that the retaining rings and rivets in the construction of the wheel did not have adequate strength, shrinkage resistance having been lost, to hold the fractured tire on its wheel center.

That the fractured tire, insecurely held, was forced off its wheel center by side thrusts usual to train movements, thus precipitating the derailment.

That the fracture of the tire was occasioned by the presence of deep thermal cracks in the tread, one of which had separated the metal of the tire to a depth of one-half its thickness and had an area of over 1½ sq. in.

That these cracks were visible on the surface of the tread and the edge of the outer end of the tire.

That the formation and extension of these cracks was due to the heat generated under the brake shoe.

That adequate means should be employed to hold a tire of this type on its wheel center independent of shrinkage resistance.

That the presence of thermal cracks on the tread of a tire is sufficient cause for the removal of the wheel from service.

MOVEMENT FOR THE SIMPLIFICATION OF TARIFFS.

Newman Erb, president of the Minneapolis & St. Louis, with a view to starting a movement for the improvement in the present methods of issuing and distributing tariffs, has written a letter to Chairman E. E. Clark of the Interstate Commerce Commission, suggesting a conference between the representatives of the carriers, the Interstate Commerce Commission, and representatives of commercial bodies in the effort to devise a better system. Chairman Clark having replied, promising the co-operation of the commission, Mr. Erb has written to the presidents or their executives of 36 of the principal railways of the United States, submitting his correspondence with Chairman Clark, and asking for their views on the subject to lay the foundation for a conference of the executives for the purpose of taking the steps suggested by Mr. Clark.

In his letter to the executives Mr. Erb says: "The simplification of tariffs to reduce the expenses incident to their issuance and distribution and at the same time so that shippers of ordinary intelligence may be able to understand them, is now, I think you will admit, a necessary step in the direction of economy and will be productive in creating and maintaining a spirit of co-operation between the railroads and the public."

Mr. Erb's letter to Chairman Clark was as follows:

"Your attention has no doubt been directed to the unscientific, unbusinesslike and expensive method of making, filing and distributing tariffs.

"The intention of Congress evidently was that tariffs should be deposited with the agent of every station to be accessible at all times to shippers, but under the present system it is almost impossible for shippers and agents of the railroads to inform themselves of the rates and classifications, and always with an unnecessary waste of time. I am quite sure that some better method of dealing with the issuance of tariffs can be devised, that will be more economical, simpler and more businesslike, and it occurred to me that it would be proper for a conference between the representatives of the carriers, with your commission and also the representatives of commercial bodies, with a view of devising a better system.

"I would like to have your views and the views of your commission, with a view of doing something, if anything can be done in that important direction."

To this Chairman Clark replied:

"I have yours of the 16th, and I am truly glad that you have become interested in the subject of simpler and more economical means and methods of providing railroad tariffs.

"I have given a great deal of personal attention to this subject because at the time the present law became effective the tariffs of the railroads were in a hopeless state of confusion. In our efforts to bring about conformity to the law and a system of tariffs from which the lawful rate could be determined, we met with much opposition, which was probably natural in view of the fact that we had to deal with so many different people, each of whom had, up to that time, been following his own personal ideas.

"I recognize fully that the system is still faulty and that the present practices involve what seem to be needless expenditures, and that the tariffs are still very complicated to those who are not practical tariff men and in some instances they are a puzzle to such experts.

"I think that conferences such as you suggest between representatives of the carriers and of the shippers or commercial bodies and with somebody representing the commission, with an idea of devising a better system, would be very helpful if entered into in a spirit of real desire to improve the conditions.

"I feel perfectly safe in saying that the commission would be glad to contribute anything it appropriately can in that direction. I think that if a committee representing the carriers could be provided and vested with some authority and endowed with some responsibility, means for greatly reducing the expenses and at the same time of improving and simplifying the tariffs could be devised.

"I do not want to be understood as suggesting undue haste, but if such a committee is provided, the members of it should be given to understand that some definite results are expected within a reasonable time."

Railway Activity in Argentina.—The Argentine minister of public works has approved plans and specifications presented by the management of the state railways for necessary improvement works on the line from Cordoba to Cruz del Eje. The cost will be $2,511,027, and it will be carried out when the state railway department has the necessary funds. The constitutional committee of the senate has reported favorably on the railway convention signed between Argentina and Paraguay on April 7 last; also on the protocol signed in Buenos Aires on June 17 last, between Argentina and Bolivia, for the immediate construction of a railway from Tupiza to La Quiaca.

NEW O.-W. R. & N. TERMINAL AT SPOKANE.

Work Which Is Now Under Way Includes Both Passenger Station and Freight Terminals at a Cost of Over $3,000,000.

The Oregon-Washington Railroad & Navigation Company is now engaged in the construction of passenger and freight terminals at Spokane involving an expenditure of approximately $3,000,000 in addition to an outlay of $4,000,000 already spent for right of way. These terminals are the culmination of a project which started three years ago with the construction of a new line from Spokane south 102 miles to a connection with the O.-W. R. & N. at Ayer, on the south bank of the Snake river, forming a new short line with low grades from Spokane to Portland. This line was described in the *Railway Age Gazette* of May 31, 1912.

The most important single item in this development at Spokane is the passenger station, the contract for the construction of which was let about a month ago. This station and the passenger yard between Monroe and Center streets is being built jointly with the Chicago, Milwaukee & St. Paul. It is reached directly from the west by the tracks of the O.-W. R. & N., and from the east by those of the St. Paul

When completed, the new passenger station will occupy the entire block between Stevens and Washington streets, and will be 300 ft. long x 58 ft. wide and 4 stories high. In addition, large baggage and express rooms will be built back under the tracks. This building alone is estimated to cost over $575,000 exclusive of real estate, and in design, arrangement and equipment will compare favorably with the most modern stations. The French renaissance type of architecture has been adopted. The main body will be of tapestry or burlap brick laid in a pleasing design. The entire front of the first story will be of cream colored stone, with a granite base surmounted with stone pilasters in front of the main waiting room and supporting a heavy stone cornice.

Four large entrance ways surmounted by a large ornamental copper glass-covered marquise provide access from Trent avenue to the large ticket and entrance lobby 168 ft. long and 33 ft. wide, with richly colored faience tile walls and mosaic floor. In the center of this room will be located the railroad and sleeping car ticket offices with telegraph and public telephones on each side. A direct entrance to the parcel and baggage checking counters will be immediately adjacent to the ticket office.

Perspective View of the New Spokane Station.

A passageway also leads from directly in front of the baggage and parcel checking counters to the street, and to carriages and hotel buses. The dining and lunch room is located at one end of the ticket concourse. At the opposite end is a barber shop with a stairway and elevator to the offices above.

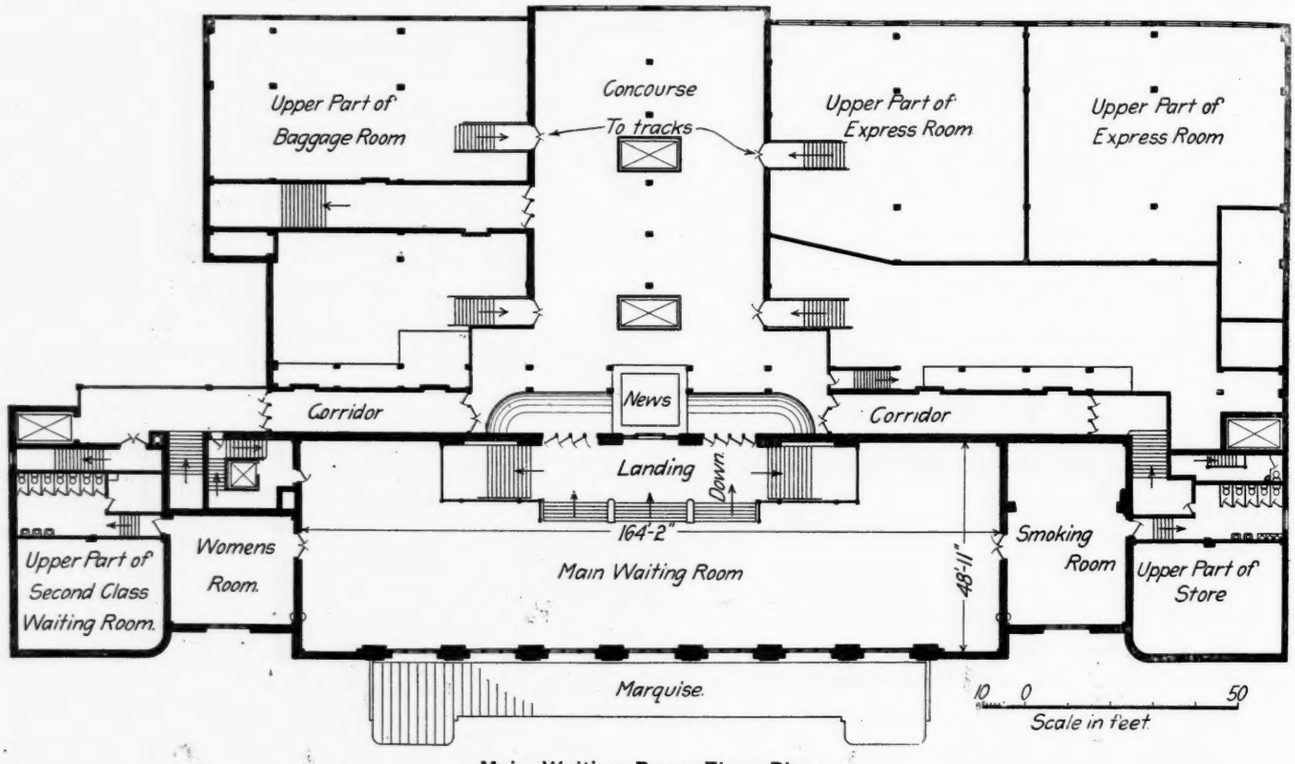
Two broad stairways will lead from this lobby to the main waiting room on the floor above. This room will be 164 ft. long, 49 ft. wide and 28 ft. high, and will be lighted by seven large ornamental metal windows. The walls will be decorated with high wainscoting of faience tile and above this with decorated plaster, while the ceiling will be broken up with heavy ornamental beams. The smoking room will be located at one end of this waiting room and the women's rest room at the other.

Two large entrance ways will lead from the waiting room to a concourse 100 ft. long and 54 ft. wide, from which all

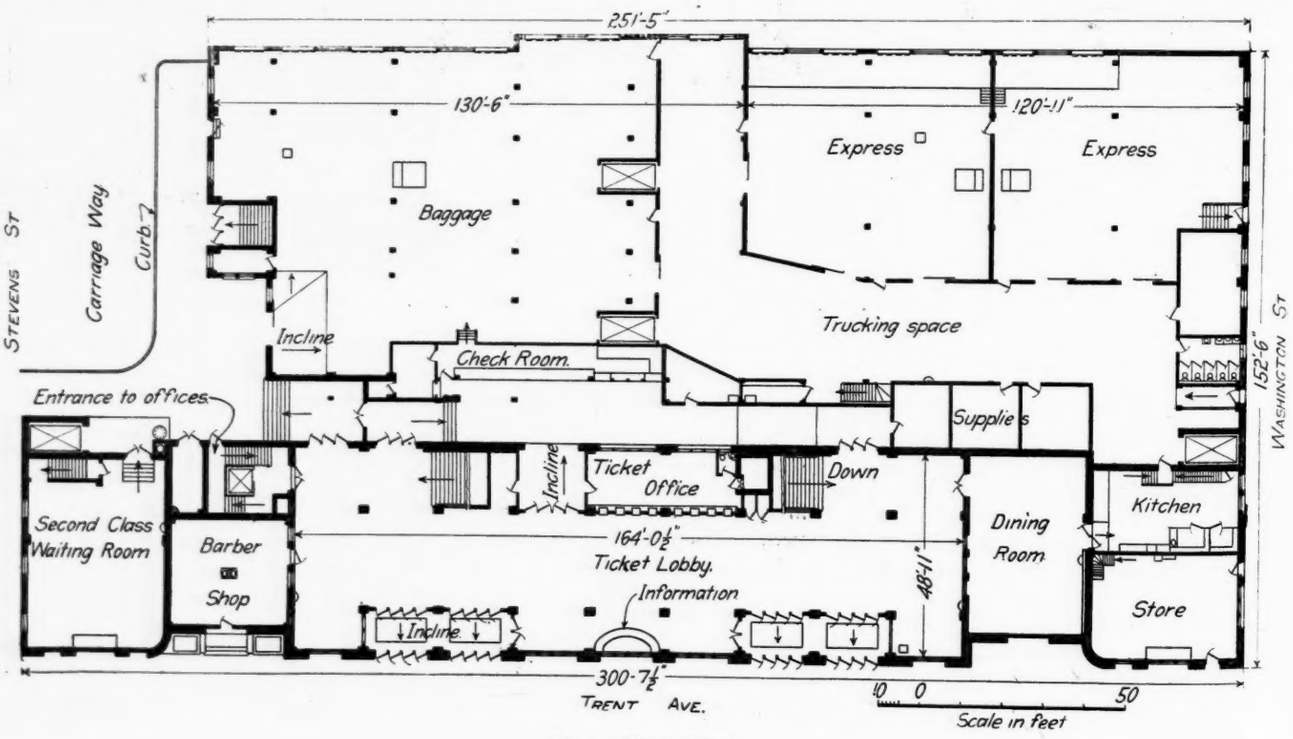
tracks will be reached by inclines and stairways, thus eliminating all crossing of tracks at grade. From the concourse, which is paneled with steel, incoming passengers can go directly to carriages and hotel buses, or to the waiting rooms.

On the street level at one end of the building will be located an emigrants' waiting room with a stairway leading to the track platform. A fully equipped hospital will also be installed. Steam heat for the buildings and for standing cars will be generated by a power plant in the basement. The building will be illuminated by concealed lights in the ceilings and massive indirect lighting pendants. Above the main waiting room are two additional floors which will be devoted to offices.

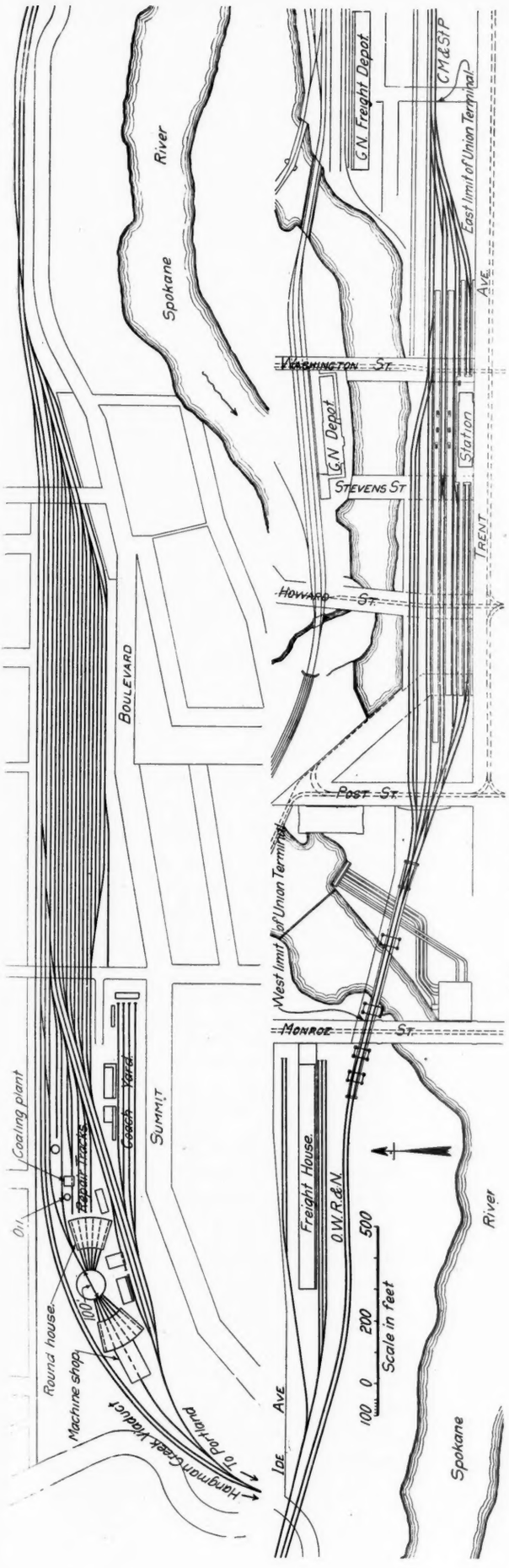
The passenger yard proper consists of a steel viaduct 2,200 ft. in length providing for 10 tracks at present. This viaduct will be 22 ft. above the street level and will require 9,540 tons of steel and 10,380 cu. yds. of concrete. The estimated cost of this work is $842,000. Immediately at the west end of the passenger station a double track steel viaduct with a concrete deck will be



Main Waiting Room Floor Plan.



Street Floor Plan.



Track Layout of O. W. R. & N. Terminals at Spokane.

built across the Spokane river directly over the Spokane Falls and 164 ft. above the water. This viaduct will be 768 ft. 6 in. long and will also cross over the recently completed Monroe street concrete bridge of the city.

Between Monroe and Cedar streets will be located the local freight house, 50 ft. x 300 ft. in size, together with team tracks, house tracks and driveway. West of this point will be located a 14-track classification yard with roundhouse, machine shop, storehouse, coal, oil and ash handling equipment, etc. This portion of the line will require over 1,000,000 cu. yds. of filling and will cross all streets overhead. At the west end of this development there is nearing completion, the Hangman creek-Spokane river viaduct, 2,996 ft. long and 176 ft. above the water. The main line is double tracked throughout from the east end of this viaduct into the station.

The designs for this terminal were worked out under the direction of John D. Isaacs, formerly consulting engineer of the Oregon-Washington Railroad & Navigation Company, and F. L. Pitman, formerly chief engineer. The actual construction work is now being carried out under the direction of E. E. Adams, consulting engineer, and J. R. Holman, chief engineer.

POWDERED COAL AS FUEL.*

By W. S. Quigley,
Quigley Furnace & Foundry Company.

In a recent article published by the Department of Industrial Research of the University of Pittsburgh, it is stated: "At the present time Pittsburgh burns in the neighborhood of 15,000,000 tons of coal annually, the cost of which is about $19,000,000, and it has been estimated on the basis of efficiency tests that there is a loss of $4,000,000 annually which could be saved by proper furnace operation."

In reality powdered coal means conservation of our coal supply. Powdered coal as a fuel is not new, the advantages of that method of firing having been fully recognized in the early Fifties, but it was not a simple matter to burn it successfully, as the enormous sums expended and lost in experimenting with it have proved. We have installed plants capable of handling over 240 tons per day and are now installing plants capable of milling, distributing and burning over 740 tons per day in metallurgical furnaces.

For best results powdered coal must be dry and fine—dry means not over 0.5 per cent. of moisture (and I might here state that in addition to the advantages in burning, considerably less power is required to properly pulverize dry coal) and fine means that 93 to 95 per cent. should pass a 100 mesh sieve or 80 to 85 per cent a 200 mesh sieve. In that state the particles are so finely divided that each one in a proper burning apparatus is surrounded by the necessary amount of air for combustion and thereby liberates the entire fuel energy of the coal at once. Being finely powdered, the volatile gases ignite the instant the fuel enters the combustion chamber and the fixed carbon is consumed while in suspension by the heat from the gases, the resultant flame to a casual observer resembling that of either oil or gas. The fire is under absolute control and is not dependent on stack draft or atmospheric conditions. The entire inflammable portion of the coal is converted into heat without any loss whatever.

The following roughly constitutes a plant for properly preparing and burning powdered coal: A coal milling building located at a place convenient to the coal supply from which the coal can be delivered to a crusher and reduced to the size required for pulverizing. From the crusher it must be elevated to a crushed coal storage bin; from the storage bin it is sent to the dryer and then elevated to the dried coal bin. From the dried coal bin it is delivered to the pulverizer, then elevated again to the pulverized coal bin, and thence

*Presented at the recent convention of the American Foundrymen's Association.

it is delivered to the distributing conveyors which supply the individual hoppers located near the furnaces, from which the coal must be fed.

The controller or device which regulates the coal fed to the burners must be flexible, as it determines the amount of coal which can be delivered or supplied to the burner. One type of controller is fastened to the bottom of a specially designed hopper or bin. It consists of two screws, the upper propelling the coal forward to a point where it falls in a steady stream past the opening through which it is forced to the burner by a jet of low pressure air, the excess coal falling to the lower screw of greater pitch, which returns the overflow to the base of the hopper. This construction makes it impossible to jam, practically fool proof and permits any portion of the falling stream, up to the capacity of the upper screw, being used by simply turning on more or less of the air—we term it controller air, it being less than one-seventh of the air required for combustion. A separate supply of air of a much lower pressure is introduced at the burner for combustion.

The controller screws are operated by variable or constant speed motors as conditions require. On small furnaces when a more or less uniform class of work is done, such as rod heating, small forgings, nut and spike work, etc., the controllers are speeded to give the maximum amount of fuel required to heat the furnaces and the operator can not exceed that amount. On larger furnaces, such as open hearth, continuous billet, reheating, etc., a variable speed motor or speed changing device is used to give a wide range of operations. Furnace operators soon become accustomed to the new fuel and have no difficulty in regulating the furnaces to suit their requirements.

The current of controller air serves a double purpose; it not only forces the coal to the burner, but in picking up the coal it is mixed with it so that upon entering the burner it expands into a cloud, which mixes readily with the combustion air and bursts into a clean flame, the length of which can be changed by adjusting the burner and varying the proportions of the furnaces to suit conditions. The volatile content of the coal also has a material effect upon the length and nature of the flame. The fires are usually started by placing oily waste or wood in front of the burner much the same as starting oil or gas fires, although on small furnaces where oil systems are already installed it is very convenient to use oil for heating the furnace 10 or 15 minutes before the coal is turned on.

In a four-door forge furnace having a chamber about 6 ft. wide x 18 ft. long used for heating engine frames, etc., in the hammer shop of the American Locomotive Company, the fuel consumption hand fired with bituminous coal was 650 lbs. per hour. With powdered coal it consumes but 350 lbs. per hour and heats 20 per cent. faster and this amount will be reduced as the heaters become more familiar with the new fuel and realize that the smoky flame they were accustomed to for so many years is not necessary. In addition the special grade of blacksmith coal formerly used cost about 35 cents more per ton.

A report from the Lima Locomotive Works shows that a large furnace for supplying a 6,000 lb. hammer and having a chamber 7 ft. 2 in. x 15 ft. 3 in., started cold at 8.15 reached a temperature of 2,200 deg. F. at 9.15 and 2,500 deg. F. at 9.45, which compares favorably with oil or gas practice. The coal used is bituminous run of mine, 34.7 per cent. volatile, having a heating value of 14,000 B. t. u. per pound, and costs $2.25 delivered at Lima. Allowing 50 cents per ton for the cost of pulverizing and distributing, which is a fair average, they get 31,360,000 B. t. u. for $2.75, or 114,036 B. t. u. for one cent as against 27,282 B. t. u. for one cent with oil, the present cost being 4⅞ cents per gallon with no posisbility of making a contract at that price.

Allowing 80 per cent. efficiency and 50 cents per ton for the cost of gasifying a ton of coal, both of which figures are in the producer's favor, average practice considered, the comparison between oil, producer gas and powdered coal based on cost of fuel in Lima, Ohio, would be:

Fuel oil	27,282 B. t. u. for one cent.
Producer gas	91,228 B. t. u. for one cent.
Powdered coal	114,036 B. t. u. for one cent.

The usual fuel consumption throughout the country is one pound of pig iron puddled per pound of coal, although considerably more is used in some plants, one visited a few days ago claiming the consumption to be 1.3 tons of coal per ton of iron. At the plant of the American Iron & Steel Company, using powdered coal, records as low as 1,083 lbs. per ton have been made while a fair average fuel consumption is 1,185 lbs. of coal per gross ton of muck bar made. The waste heat is utilized in off heat boilers mounted over the furnaces and to preheat the air for combustion to about 600 deg. F., which adds about 20 per cent. to the economy. As compared with producer gas the cost of installation is less. High temperature can be readily obtained without regeneration, and the loss in gasifying is eliminated.

It is not necessary to use cheap or poor grades of coal in order to make savings. The analysis of the fuel and the heating value should be considered, a high volatile, low ash and low sulphur being the most desirable.

PURE DRINKING WATER ON THE SOUTHERN PACIFIC.

The bulletin of the passenger department of the Southern Pacific contains a description of the methods used to provide pure drinking water for passenger trains on that road. The details apply to the Los Angeles division, but similar methods are applied on other parts of the system.

Los Angeles is the principal icing place for outgoing trains of the coast and valley lines, and the line leading to El Paso, Tex. Water is purchased from the city, and the ice is made from distilled water. After being sawed it is washed, placed in a clean covered cart and carried to the coolers. It is handled by men clad in white duck, with white rubber gloves, and they are required to change their garb frequently and to present a neat appearance at all times. The cart is steam cleaned at intervals, and the water coolers are steam cleaned and sterilized before the train departs. This is the custom at all the most important icing points. At Indio the water supply is artesian, and remarkably pure. In the Imperial valley the only drinking water is that from canals supplied by the Colorado river. To provide passenger trains and waiting rooms in this valley water is carried in cans from Mecca, where the artesian flow is reputed to be the purest in the state. The 20-gal. cans in which the water is carried are frequently sterilized, and ice is handled by gloved hands, in buckets and by the use of tongs. Every six months the water supply is analyzed and a certificate of the purity is issued by the proper health officer. Ice is certified in the same way.

For the use of passengers pasteboard drinking cups are on sale on all trains by the news company, and by all agents at passenger stations. The Crane automatic drinking fountain has been installed at Los Angeles and 15 other important stations. In these fountains coiled pipes are iced, and the water made cool as it passes through them.

RUSSIAN RAILWAY CONSTRUCTION.—The Russian minister of ways and communications will shortly undertake, at the expense of the State, the construction of a railway line from Meref to Cherson. It is announced that the Russian minister of commerce regards favorably the project for the construction of a railway from the Nadejdinsk works to Archangelsk, in view of the exploitation of the naphtha area of Ouchta.

CONDITIONS IN THE INVESTMENT WORLD.*

Expansion of Industrial Effort and National Tendency to Excessive Borrowing Have Deteriorated Character of Bonds.

By James J. Hill.

The superior efficiency of wealth united under corporate management over money employed in small sums by individuals has concentrated investment in corporations. Investment securities are mostly stocks and bonds. The former entitle the holder to a proportionate voice in the management of the concern, and to a share in the profits or a responsibility for the losses. The place of the share of stock has changed little. The bond has been subject to alteration and dilution. With a great increase in total volume has come a depreciation of many of them in both reputation and quality.

A corporate bond is a lien on the property that it covers. The bondholder being a contingent owner, and taking precedence of the stockholder, the bond had a special value of its own. The very name became a synonym for security. And until comparatively recently nothing has happened to impair this confidence, just shown to be so essential an element in credit. A bond could become a losing investment only in the case of so large an issue or so serious a depreciation in the property that its total proceeds would not equal the total of outstanding bonds. Formerly this was a possibility too remote to be taken into consideration in the case of legitimate business concerns.

It happened, perhaps inevitably, because of the increase of capital for investment, the increase of vision and of daring among borrowers, and the assured reputation of the bond, that its standing was slowly sapped. The repudiation of debts by some American states gave public credit a heavy blow. Panics and reorganizations compelled a closer scrutiny of corporate securities. But the main cause of such deterioration as the bond has suffered is the putting out under that name of a great volume of paper promises which are not entitled to it. And this is partly the effect of the excessive borrowing and spending of our day, and partly that of an expansion of industrial effort and an inflation of the capital of industrial enterprises which have often raised the total of bond issues, heretofore representing the value of the property under the hammer, to approximately the figure that would once have covered stock and bonds combined. In fact, the stock of more than one pretentious concern would have nothing behind it if the bondholders had to be paid off. Nor could the latter themselves hope to receive dollar for dollar on a forced sale. The dangerous proportions of this abuse of credit are shown in a recent address by Joseph T. Talbert, vice-president of the National City Bank. He said: "If we take the ten years from January, 1904, to January, 1913, inclusive, and tabulate the comptroller's reports for national banks, the first call of the year, we find that loans increased from $3,511,000,000 to $6,147,000,000—a net increase of $2,636,000,000, or 75 per cent. During the same period the deposits of these banks increased from $4,789,000,000 to $8,361,000,000—a net increase of $3,572,000,000, or 74.6 per cent. During the same period the investments in railroad, municipal, public service, industrial and miscellaneous bonds increased from $555,000,000 to $1,057,000,000, or 90.4 per cent. These figures are dazzling and they are so large as to become confusing. Taking a shorter period and beginning with the year before the panic of 1907, we find that the net increase in the loans of national banks is slightly over $2,000,000,000, or nearly 50 per cent. During the same period the deposits increased $2,613,000,000, or about 45 per cent. Investments increased $383,000,000, or about 60 per cent."

INFLATION IN BONDS ISSUED BY PUBLIC BODIES.

Criticism, or even a proper understanding of the situation calls for discrimination between the classes into which bonds are divided. First are those of public bodies; the government, states, counties, cities and sometimes villages. Here a frightful inflation is going on. An old-fashioned public aversion to debt still holds the nation and, to some extent, the states in check; though many of the latter evade it by marketing certificates of indebtedness which differ from bonds only in the shorter time they have to run and the inferior weight of the sanction behind them. The total national debts of Europe rose from about eight billion dollars in the period 1845-48 to nearly thirty billion dollars in 1905-07. With the exception of a slight rise in 1899, made good the following year, the total debt of the United States, less cash in treasury, was greater on the first of last May than it had been for 25 years. In a study of credit made some time ago, I showed that the net ordinary expenses of the United States government had increased 1.4 per cent. between 1870 and 1890, and 121.4 per cent. between 1890 and 1908; while between 1890 and 1909 the expenditures of the 30 states from which reliable reports could be obtained had increased 201.6 per cent.

Most of our cities are mad spenders; intent only on securing an increased margin for bond issues by raising the assessed valuation. Not a few of them are meeting part of their current expenditures by issuing bonds; while refunding, instead of levying taxes to pay at maturity, has become the almost invariable rule. Several large cities whose credit has always stood high have offered bonds within the last few months without finding takers, even at an increased interest rate. This collapse of the market is due not only to a relative scarcity of investment capital at the time, but also to an underlying consciousness on the part of the public that the danger line has been reached. A state, county or city has no income or resources aside from taxation. Public buildings, public improvements, school houses and the apparatus of fire departments could not be sold without dissolving the community itself. They are only imaginary assets. The issue of bonds in excessive volume has, therefore, compelled the buyer to consider a possible inability of the people to pay. That point will presently be reached unless we sharply correct the prevailing policy.

In the five years between 1907 and 1912 the sales of municipal bonds in the United States nearly doubled. According to a summary made this year by the *Commercial and Financial Chronicle,* the average sales for the period immediately preceding 1904 were about $150,000,000 a year. In 1911 they were $396,859,000, and in the dull year 1912 they were $386,551,000. This is an enormous increase for the market to digest. But it is far from telling the whole story. This amount represents only our own actual municipal bonds sales within the territorial limits of the United States.

It is fairly certain that our market cannot absorb such a flood without a perceptible increase in the interest rate and some financial derangement in the conduct of ordinary business. Thus the unchecked rage for borrowing affects not only those who issue and those who sell securities, making it more difficult to place bonds, but also general business operations, by lessening the supply of available free capital and increasing the price at which it can be had.

INDUSTRIAL BONDS.

The situation with regard to bonds generally spoken of as "industrials" is worse. The field is so large and so diverse as to defy statistical tabulation. Hundreds of millions of bonds have been issued to promote consolidations, these securities being part of the purchase price of the smaller concerns to be united in one big corporation. Other hundreds

*Abstract of address at the annual banquet of the Investment Bankers' Association of America, Chicago, October 30, 1913.

of millions have been issued against property still to be developed, such as mines, timber lands, irrigated lands and even ordinary real estate, where many separate holdings are combined in the hands of an active selling or developing concern. These are of varying degrees of soundness; from the bond with property behind it that would fetch face value at a forced sale at any time, to more speculative pledges of a future realization or increment that is little better than a guess. Finally, there is the enormous mass, recorded only locally and beyond any reliable estimate in amount of bonds that are not, in view of the flimsy or insufficient security behind them, entitled to be called bonds at all.

In days of soberer financing, an industrial concern was capitalized at somewhere near the amount of cash actually put into the business. With the advent of the large corporation, capital stocks began to grow by multiples of 5, 10, 100. A company could scarcely respect itself if it had less than a million dollars of capital stock; while from five to a hundred millions became not uncommon. Now the market for stock shares is always limited. The supply increased so fast, the underlying values became so attenuated or doubtful, that some additional assurance was needed to bring in the ready money. Here began the deterioration in the significance of the word "bond." Finding that bonds would sell where stocks would not, the promoter substituted the latter for the former. A concern that might reasonably have carried a total capitalization of $500,000 bonded itself for that amount, and issued half a million or a million dollars of stock in addition. Little local manufacturing or commercial corporations bonded themselves for the limit; the bond in these cases, of course, being nothing but a share of stock, and having no sounder value behind it. The old definition of a bond no longer fits.

In fixing capital stock, a corporation may, to some extent, capitalize its good will. It is not always illegitimate or at all uncommon for a business concern to capitalize its actual profits for a year or a period of years past, sometimes even to capitalize future profits based on percentages of actual past growth, and issue stock to correspond. Except where a community is young, growing rapidly and has a future assured by its possession of great natural resources, this is dangerous financing. But if this capitalization consists of stocks only, and the process is without misrepresentation of facts, the effect is not so bad. The investor knows what he is getting, and takes his chance of a loss for his chance of a profit. The investment market is seldom demoralized in this way. Any disappointment in outcome is part of the necessary percentage of failures on which all business growth is built. But when exactly the same representations are made and the same security is offered for a so-called "bond" issue, the circumstances are materially altered. The old meaning of the word is destroyed. The market for legitimate bonds is impaired. Credit is affected by this tampering with one of its main supports, and the results are disastrous to the community as well as to the investor.

Formerly, and always in any properly financed undertaking, the limit of a bond issue is the total cash value of tangible property in possession; not its value for the uses to which it is being or is to be put, but its value as an asset for immediate conversion by forced sale at any time into cash. Under this rule the investor might rest secure. The worst that could happen to him would be to have to take over this property, in case of a receivership, wind up the business and get back his money. About all that he could lose would be the interest on his investment for the unrealized term of the life of his bond. Now it is altogether different. Not only wild-cat concerns, which are outside the range of this discussion, but companies of real merit and solvency, conducted by men who would scorn to do an act commonly recognized as dishonorable, do not hesitate to bond their businesses for very much more than could be obtained from either a forced sale or a careful liquidation. Plant is set down at its cost or its estimated value in use, and not its selling price as real estate and second-hand machinery if affairs had to be wound up. And in addition, present or prospective profits or both, and sometimes mere good will, are capitalized. The security behind the bond has deteriorated. Its value is diminished. Capital takes alarm. Loans must be made at a higher rate and are harder to place. Instead of a man's word being as good as his bond, his bond has become no better than his word. Securities of that name which actually deserve it, by being worthy of their lineage and true to the traditions of their past, must jostle their way to market through a mob of tatterdemalions with scarcely a rag of respectability to cover their poverty and deceit.

RAILWAY BONDS.

Without undue preference for the interest to which most of my active life has been given, I think I may say that the railroad bonds of this country as a rule have remained faithful to their trust. For one thing, it is practically impossible to place an over-issue of railway bonds. If a manufacturing or commercial concern liquidates, its property has only current real estate value unless some successor wishes to carry on the same or a similar business. If an industrial enterprise is wrecked by competition that it cannot meet, by a shift in the market for raw materials, by a cessation of demand owing to changed conditions or new inventions, its bonds may fall to a few cents on the dollar; because the intangible values behind them are reduced to nothing, and the tangible can no longer be turned to profitable use. A railroad is differently situated. Its business cannot be discontinued. While it may and does suffer from unjust legislative and other assaults that add to its expenses and subtract from its revenues, it enjoys as a compensation security through the courts against actual confiscation. The road and its belongings will always remain there. They can always be operated. They must be operated by somebody. Therefore the security cannot altogether vanish; and the experience has shown that it will eventually bring, under wise management, some return in the most desperate cases.

So far as the old, established properties, with an unbroken record for payment of interest and dividends, are concerned, there is no security that can compare with them for safety of the principal and certainty of the interest payment. The United States government itself has been compelled to suspend specie payments; but the best railway systems of the country went through the stress that drove it to the wall without disappointing investors in them of one dollar when it was due or expected. There never was a bond issued through the centuries since the word first came into use which better deserved to bear the title than the first-class railway bonds that are the favorite investment today of the great life, fire and accident insurance companies, of savings banks, of all who make it their first condition that a security shall have full value behind it, pay at maturity, and be readily convertible into cash with the least shrinkage, even in time of public panic and financial demoralization.

Limitations by law on increase of capitalization are of recent origin. The managements of our railways have, for the most part, financed them voluntarily, so far as bond issues at least are concerned, moderately and wisely. The amount of railway capital outstanding in 1911 was, by official report, a little over $19,000,000,000. Of this, $10,738,000,000 was funded debt, $7,825,000,000 of that amount being bonds. There is no present means of estimating the total money value of railroad property. We do know that it represents the greatest property interest in the country next to the land on which we live, and its improvements. It is so far in excess of capitalization that the margin of safety is plainly in view. It is so much farther from the total of the railway bonded debt that the most careful administrator of a trust never guarded it more completely against possible depreciation.

I showed six years ago that the actual growth of the transportation business called for an immediate investment of at least one billion dollars a year for five years, to catch up with traffic demands. The event proved that forecast under instead of above

the mark. The need grows continually with the increase in population and the development of the country. The money obtained by the sale of securities is put into construction and equipment. So we need not be surprised to learn, according to an estimate made by the *New York Times*, that while, in the year ending October 1, 1912, the railways issued stocks and bonds to a total of $23,821,000 less than the year preceding, the industrial concerns issued $362,000,000 more. The remaining class of bonds, those of public utilities, require no separate discussion. Water bonds in most cases stand on the same footing as those of the municipality; gas and electric light bonds are simply a special form of industrials; while street railway bonds resemble those of the steam railways, except that generally a mere franchise instead of an ownership of property is the main guarantee behind them. The creation of public utilities commissions in various states tends to consolidate or standardize all these, so far as their sanction and security are concerned, into a special class of state-approved but not state-guaranteed security.

This survey and analysis should explain whatever may seem mysterious or discouraging in the recent course of the bond market. In spite of the care with which men who understand and respect the limitations of credit attempt to guard and restrict bond issues, the grand total mounts so fast and the security is so progressively impaired that the investor hesitates. Those who are desperate for capital bid higher. The rate of interest rises. So does the risk. And these results, unhappy for the borrower, unhappy for the lender, discouraging and dangerous for the community, will continue until the country reconsiders and amends its ways. The two noticeable features of the general bond situation are the extraordinary conservation in the increase of the railway bonded debt and the extraordinary recklessness of public authorities and the managements of industrial enterprises, taken as a whole, in forcing out every dollar of bonds that anybody will take, until they must finally be advertised as summer sales and peddled out over the bargain counter. Less spending for purposes that can wait; less borrowing on any terms; and a clear distinction between the different classes of security and instruments of credit, so that each shall make its own appeal and cherish its own value, are the only conditions upon which improvement can be hoped. The investment market cannot know a prosperous activity, except by feverish starts to be followed by still more pronounced reactions, until the immutable laws of credit have been generally recognized and respected.

SUMMARY OF PRESENT CONDITIONS.

There is plenty of capital in the country. The extent and productivity of our soil, the enterprise of our business men, the sagacity of capital and the industry of labor are continuing that marvelous accumulation of resources which constitutes the aggregate of the nation's wealth. The rate of interest is low for call loans, except in temporary crises. The man with money is content with a small return if he is sure of getting it back the instant a cloud rises in the sky. The reserves of the New York banks show an ample store. But long time loans are hard to place at rates from one-third to one-half higher than they were even three or four years ago. "The simple truth," says a recent financial criticism, "is, the country today is suffering as perhaps never before except in times of actual panic, from a loss of confidence. The money market is abundantly supplied with funds, but there is timidity and fear, so that no one is willing to let his funds go out of reach." There could be no completer illustration of the essentials of credit. The investor is not sure today of either the ability or the intention of the soliciting borrower to pay at maturity. The country is waterlogged with bonds. Confidence cannot be restored until the name "bond" has won back something of its old standard. And that cannot happen until issues are limited by moderation, conformed to the value of the security and confined to the margin of safety and the form of credit for which the bond was originally designed.

A new situation confronts the country, as well as the dealers in investment securities and the men who must find new capital wherewith to satisfy legitimate business needs. Formerly 3½ per cent. in some cases, and at most 4, was regarded a satisfactory return on a gilt-edged bond. Today the best issues are much higher. Some first-class properties have paid 6 per cent. for short-time loans. This rise, computed on the face of the outstanding securities of the country, represents a tremendous annual tax. It is reflected, of course, not only in the higher cost of living but in a decline of bond prices. This ranges, for high-grade paper, from 4 to 15 points, and in particular cases more. Many financial experts look for a remedy only "through a decline of prices until the interest yield on the money invested in the old issues approximates the increase from the newer bonds, which pay a higher rate of interest." This, of course, is the natural way of working off a debauch, by the operation of natural laws. But it entails great hardship on millions of worthy investors, on savings banks, on those least deserving to suffer. And since, in the main, the situation was not created by observing economic law, but by its violation, it would seem not unreasonable to seek relief by curbing those qualities which have impaired credit, retarded investment and demoralized legitimate business by an over-issue of under-secured bonds, both corporate and public.

After all has been said, the main explanation of prevailing conditions in the bond market runs back to the old law of demand and supply. There has been too much spending and borrowing. The individual, the corporation, the municipality is no longer willing to pay as it goes. The future is mortgaged until the interest charge alone absorbs more current revenue than can be spared. This is the standing danger, the crowning abuse of credit, from which no age has been free. It has been the cause of every act of currency inflation, always aggravating the evil. Inflation by bond issues in excess is just as dangerous in practice, produces the same effects and leads to the same end. Correct this, and the troubles of the market will be relieved; since credit always adjusts itself automatically to the public need when freed from artificial stimulation or compulsion. Let the present abuse of credit continue, and an abyss of possible suffering and financial distress opens before us. This need not happen. It will not happen if the wiser counsel and the conservative view re-assert themselves.

EMPLOYEES OPPOSE CHICAGO ELECTRIFICATION.

Employees of the Chicago railways are taking a lively interest in opposing the ordinance now pending in the Chicago city council which would require the operation of trains within the city after July 1, 1915, "by other power than that of steam or in a manner that will not produce smoke or any noxious gases that injuriously affect the public health, comfort or convenience."

After the ordinance had been recommended for passage by the committee on railway terminals, representatives of the employees made a fight against it in the city council, and it was referred back to the committee to give the employees a hearing. The railway brotherhoods have organized the Chicago Steam Railroads' Employees' Safety Association, and a committee representing this association appeared before the council committee on October 22, to ask that their hearing be postponed for two weeks to give them time to present data regarding the dangers of electrical operation to the employees. The committee voted to hold the hearing on November 3, after Alderman Long, who introduced the ordinance, had accused the employees of being "sent in as cats-paws for the corporations to obtain further delay." After the committee had declared that the men had an interest in opposition to electrification independent of the railway companies Alderman Long insisted that the ordinance does not require nor contemplate electrification, but is intended simply to compel the roads to become more active in developing smoke preventing devices.

The employees have set forth their argument in a pamphlet addressed to the business men of Chicago entitled "Elec-

trification of the Chicago Railway Terminals from an Employee's Standpoint."

The pamphlet declares that while the ordinance does not mention the word electrification, "this is a pure subterfuge, as it is well known that there has not been invented any other power except steam, that has proved at all practicable for railway operation other than electricity. Steam railroad employees are opposed to electrification at the present time primarily from a safety point of view, because if electrification is forced upon the railroads either the third rail or overhead trolley would have to be used, with their well-understood dangers to life and limb, adding many new dangers to an already exceedingly hazardous occupation. Under the present conditions, as they exist in Chicago, either the overhead trolley or the third rail system would be a constant menace to the lives and limbs of employees in all departments."

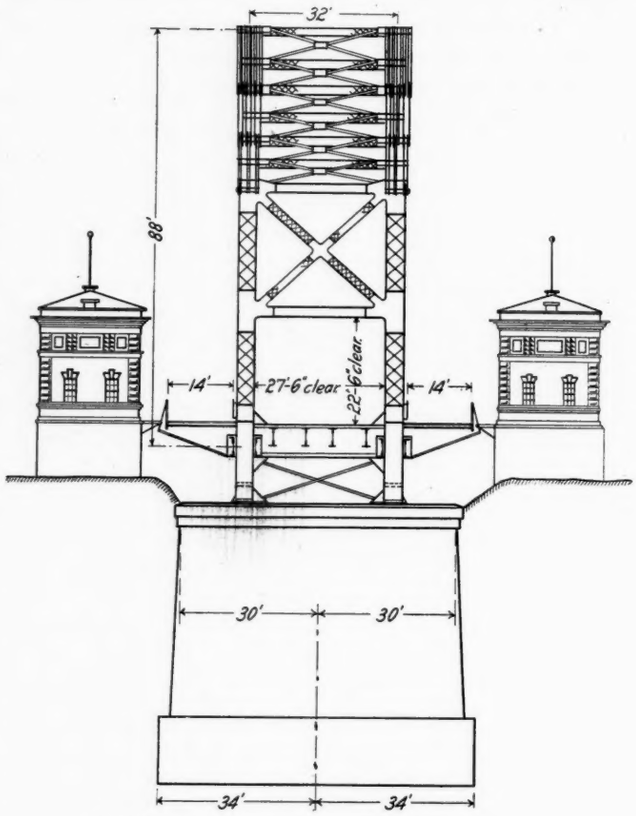
It is also asserted that if compelled to electrify the roads will naturally seek to remove as many as possible of their operations outside of the city, so that road crews will leave from outside terminals and that the yards and roundhouses will, of course, have to be located at such terminals, thus compelling a large proportion of the men to give up their homes in the city and move outside. On the ground that there are some 48,000 railroad employees in the city who would be affected by such a condition, representing 192,000, when their families are taken into consideration, and spending a payroll of approximately $4,000,000 a month, the business men are asked to oppose electrification in order to avoid losing some of their best customers. Other arguments are that electrification would reduce wages, or force out of employment many who have been trained in steam service, but who are too old to adapt themselves to new conditions, and would cause many to lose their fraternal insurance on account of the increased hazard. It is also declared that doing away with the locomotive smoke would have but a small effect on the general smoke nuisance, and that even if the railways make as much as 42 per cent. of the smoke, as estimated by a former city smoke inspector, the larger percentage of smoke and dirt from other sources could be eliminated at a fraction of the cost of electrification. Improvements which the roads have already made by introducing smoke consumers and using a better grade of fuel, are cited, with a statement of the city smoke inspector that the locomotive smoke density was reduced from 23 per cent. in 1910 to 7 per cent. in 1912.

The difference in conditions in Chicago, with its network of yards and switching tracks, and in New York, where comparatively simple passenger terminals have been electrified, are cited to show that electrification would be impracticable in Chicago under present conditions. The statement closes with the following: "Do the business men of Chicago want to force the railroads into a backward step that will increase the dangers to their employees? We believe in progress, we are not opposed to modern developments. But we also believe in 'safety first' and the conservation of humanity. We also believe that any legislation to increase the dangers of our occupation, and that will drive us as workmen and citizens out of our homes that we have worked years to obtain, into open territory where we shall have to build up new homes, schools and churches, is a poor progressive step and the rankest kind of class legislation. Do you want to lose our patronage? Are 48,000 picked workers, representing a payroll of $4,000,000 a month, worth keeping as citizens of Chicago? If you think they are, if you believe in keeping the railroad accident roll down to a minimum, you will oppose the electrification of the Chicago terminals until such time as it can be done without increasing the dangers of an already hazardous occupation. If the facts stated above appeal to you get busy with your alderman, voice your sentiments among your associates, take the question up in your business organization."

NEW MISSISSIPPI RIVER BRIDGE AT MEMPHIS.

The Arkansas & Memphis Railway Bridge & Terminal Company was organized last spring for the purpose of building and maintaining a double track railway and highway bridge over the Mississippi river at Memphis, Tenn., to provide an entrance to the city from the west for the Chicago, Rock Island & Pacific; St. Louis, Iron Mountain & Southern, and the St. Louis Southwestern. These lines had previously used the single track bridge of the St. Louis & San Francisco, but the capacity of this structure was not great enough to handle the increasing business of all of these roads. The stock of the new company is owned in equal proportions by the three interested roads. The preliminary plans for the new structure have been completed and the work on the substructure has been begun. The first caisson was launched on October 14.

The new bridge will be located 200 ft. up-stream from the Frisco bridge and parallel to it. The main channel spans will

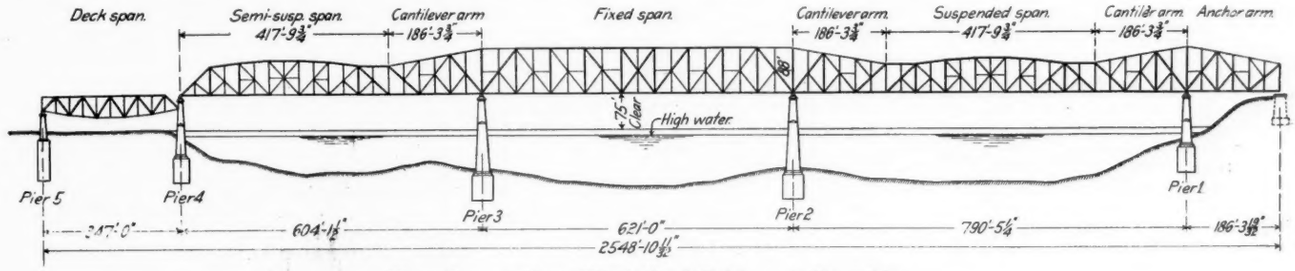


End Elevation of New Memphis Bridge.

have the same opening as the main channel spans of the old bridge, although pier 4 has been moved 17 ft. toward the river in order to make the suspended spans shorter. While the suspended spans in the old bridge were 451 ft 8 in. long, those in the new bridge will be only 417 ft. 9¾ in. long. The structure has an overall length of 2,548 ft. 10⅝ in., and consists of the following spans: One deck span, 345 ft., one semi-suspended span, 417 ft. 9¾ in.; one cantilever arm, 186 ft. 3¾ in.; one fixed span, 621 ft.; one cantilever arm, 186 ft. 3¾ in.; one suspended span, 417 ft. 9¾ in.; one cantilever arm, 186 ft. 3¾ in., and one anchor arm, 186 ft. 3¾ in. The trusses will be spaced 32 ft. center to center, giving a clear width between trusses of 27 ft. 6 in. The double track railway line will be carried between these trusses, the tracks being spaced 13 ft. center to center. Two 14 ft. roadways will be carried on brackets outside of the trusses. The maximum depth of the trusses is 88 ft. The load-

ing assumed in the calculations is as follows: For trusses: Live load, 4,000 lbs. per ft., and 40,000 lbs. concentration on each track, also 500 lbs. per lineal ft. on each roadway, except in the case of the suspended span, where 600 lbs. per lineal ft. was used. Unit stresses have been taken conservatively, so that even with a loading on each track corresponding to E-70, no member in the bridge will be stressed over two-thirds of the elastic limit: Track floor: Two engines, 177½ tons on each track (Cooper's E-50): Roadway floor; 17½ ton road roller and 100 lbs. per sq. ft.: Windloads; loaded structure; 30 lbs. per sq. ft. on train and floor as seen in elevation, and in addition, area of truss members for two trusses. Unloaded structure; 50 lbs. per sq. ft. of exposed area of members for two trusses. Two designs are now being prepared, one, that of eye-bars in the continuous structure made of alloy of steel of an elastic limit of 48,000 to 50,000 lbs., and the remainder of the structure of carbon steel; and one where all truss members except those in the anchor arm will be of alloy steel.

To comply with the requirements of navigation on the river, the clear height above the channel is made the same as in the present bridge. This makes the two center piers about 147 ft. high. The elevation of the water in the river is subject to a variation of over 45 ft. The piers will be founded on pneumatic caissons and will be of concrete with a granite facing. The granite will be secured from Stone Mountain, Ga. The high piers have an overall dimension on top of 16 ft. 6 in. x 56 ft. 6 in., and a dimension under the coping of 14 ft x 54 ft. The shaft of the pier is battered ½ in. per foot, and is carried on two 3-ft. footing courses over the caisson. The caissons are



Elevation of New Mississippi Bridge at Memphis.

90 ft. x 42 ft., and about 50 ft. high. It is expected to land the bottom of the caissons at elevation 84.25. The piers will be sunk through a very stiff clay. The assumptions made in the design of the substructure were based on the very complete data available from the experience in building the former bridge and it was only necessary to take a comparatively few test borings to check these assumptions.

The substructure is being built by the Union Bridge & Construction Company of Kansas City on a percentage basis. The contract for the superstructure will not be let until late in the winter or early next spring. The designs were prepared under the direction of Ralph Modjeski, civil engineer, Chicago.

State Railway Mileage in Queensland.—The total length of railways included in the Queensland state system on June 30, 1912, was 4,266 miles, inclusive of the Etheridge Railway (143 miles), which was built by a private company but is operated by the state railway department. The lines are 3 ft. 6 in. gage.

Private-car Trouble in England.—After the end of this year no wagons (freight cars) will be allowed on the railways in Great Britain which are not fitted with spring buffers. This is in accordance with a notice issued by the Clearing House seven years ago; but it is said that the proprietors of coal mines have from 8,000 to 12,000 wagons still in use which have only "dead" buffers—those not fitted with springs. What can be done with these cars after December 31 is a question which now gives rise to some anxiety.

DEMANDS OF THE WESTERN ENGINEMEN.

The demands of the western enginemen were served upon the Western Association of Railroads on October 10, by the chiefs of the two enginemen's organizations. The following are the changes demanded by the employees:

Article I.—Basis of a Day's Work.

Passenger Service.—One hundred miles or less, five hours or less, will constitute a day's work in all classes of passenger service. All mileage in excess of 100 miles shall be paid for pro rata.

All Other Service Except Switching.—One hundred miles or less, 10 hours or less, will constitute a day's work in all classes of service except passenger and switching service. All mileage in excess of 100 miles shall be paid for pro rata. Ten miles' run will be the equivalent of one hour's service performerd, or vice versa.

Overtime in passenger service will be computed and paid for on a basis of 20 miles per hour, at rate for each class of engine used.

Overtime in all other service except passenger and switching service will be computed on a basis of 10 miles per hour, and paid for at the rate of 15 miles per hour, at rate for each class of engine used.

All overtime will be computed on the minute basis.

Article II.—Rates of Pay.

The rate in passenger service on locomotives other than the Mallet type weighing less than:

	Engine-men.	Fire-men.
80,000 lbs. on drivers shall be	$4.50	$2.90
80,000 lbs. and less than 100,000 lbs. on drivers	4.60	3.00
100,000 lbs. and less than 140,000 lbs. on drivers	4.80	3.15
140,000 lbs. and less than 170,000 lbs. on drivers	5.00	3.25
170,000 lbs. and less than 200,000 lbs. on drivers	5.15	3.40
200,000 lbs. and less than 225,000 lbs. on drivers	5.35	3.50
225,000 lbs. and less than 250,000 lbs. on drivers	5.50	3.65
250,000 lbs. and over on drivers	5.60	3.75

In all classes of service except passenger and switching service on locomotives other than Mallet type weighing less than:

	Engi-neers.	Fire-men.
80,000 lbs. on drivers shall be	$5.00	$3.25
80,000 lbs. and less than 100,000 lbs. on drivers	5.20	3.40
100,000 lbs. and less than 140,000 lbs. on drivers	5.40	3.50
140,000 lbs. and less than 170,000 lbs. on drivers	5.60	3.65
170,000 lbs. and less than 200,000 lbs. on drivers	5.80	3.75
200,000 lbs. and less than 225,000 lbs. on drivers	6.10	4.00
225,000 lbs. and less than 250,000 lbs. on drivers	6.40	4.25
250,000 lbs. and over on drivers	6.70	4.50

Mallet type engines, all classes of service, except switching service, weighing less than:

	Engi-neers.	Fire-men.
250,000 lbs. on drivers	$7.50	$4.90
250,000 lbs. and less than 300,000 lbs. on drivers	7.75	5.10
300,000 lbs. and less than 400,000 lbs. on drivers	8.00	5.25
400,000 lbs. and over on drivers	8.25	5.50

Engineers and firemen on locomotives in pusher and helper service, mine runs, work, wreck, belt line and transfer service, and all other unclassified service, will be paid through freight rate according to the class of engine.

On all divisions where grade is 1.8 per cent. or over, an increase of 10 per cent. over valley rates will be paid.

On roads where narrow gage locomotives are in service, a 5 per cent. increase over present rates in effect shall be granted.

Wherever electric, multiple unit, gasoline or other service is installed as a substitute for steam, or is now in operation on any railroad parties to this agreement or on any of the tracks operated or controlled by any of them as part of their system, the locomotive engineers and firemen shall have the right to the position of motorman and helper, respectively. The term "helper" will be understood to mean the second man employed on electric locomotives or other power.

Seniority rights to be interchangeable. Steam rules, hours of service and mileage to apply with the following rates of pay:

Passenger service—	Motor-man.	Helper.
20,000 lbs. tractive power and less	$4.50	$3.35
Over 20,000 lbs. tractive power and less than 25,000 lbs.	4.60	3.35

Passenger Service—	Motor-man.	Helper.
Over 25,000 lbs. tractive power and less than 30,000 lbs.....	4.70	3.35
Over 30,000 lbs. tractive power and less than 35,000 lbs.....	4.80	3.35
Over 35,000 lbs. tractive power and less than 40,000 lbs.....	4.90	3.35
Over 40,000 lbs. tractive power and less than 45,000 lbs.....	5.00	3.35
Over 45,000 lbs. tractive power and less than 50,000 lbs.....	5.15	3.35
Over 50,000 lbs. tractive power and less than 55,000 lbs.....	5.35	3.35
Over 55,000 lbs. tractive power and less than 60,000 lbs.....	5.50	3.35
Over 60,000 lbs. tractive power and over.....	5.60	3.35

All Other Service Except Passenger and Switching—	Motor-man.	Helper.
20,000 lbs. tractive power and less.....	$5.00	$3.75
Over 20,000 lbs. tractive power and less than 25,000 lbs.....	5.20	3.75
Over 25,000 lbs. tractive power and less than 30,000 lbs.....	5.30	3.75
Over 30,000 lbs. tractive power and less than 35,000 lbs.....	5.40	3.75
Over 35,000 lbs. tractive power and less than 40,000 lbs.....	5.60	3.75
Over 40,000 lbs. tractive power and less than 45,000 lbs.....	5.80	3.75
Over 45,000 lbs. tractive power and less than 50,000 lbs.....	6.00	3.75
Over 50,000 lbs. tractive power and less than 55,000 lbs.....	6.20	3.75
Over 55,000 lbs. tractive power and less than 60,000 lbs.....	6.40	3.75
Over 60,000 lbs. tractive power and less than 65,000 lbs.....	6.60	3.75
Over 65,000 lbs. tractive power and less than 70,000 lbs.....	6.80	3.75
Over 70,000 lbs. tractive power and over.....	7.00	3.75

Switching Service—	Motor-man.	Helper.
20,000 lbs. tractive power and less.....	$4.75	$3.10
Over 20,000 lbs. tractive power and less than 40,000 lbs.....	5.00	3.10
Over 40,000 lbs. tractive power and less than 60,000 lbs.....	5.50	3.10
Over 60,000 lbs. tractive power.....	6.00	3.10

Article III.—Local or Way Freight Service.

Local trains are way freight or mixed trains whose work is the loading or unloading of freight or doing station switching en route.

Engineers and firemen on such trains will be paid 10 per cent. increase over through freight rates.

Through or irregular freight trains doing work such as loading or unloading freight, stock or company material, switching at stations, spurs, mines, mills, or required to pick up or set out cars, unless cars to be picked up are first out, or cars to be set out are switched together at terminals, or doing any other similar work, shall be paid for same at overtime rates in addition to time or mileage made on the trip.

Article IV.—Switching Service.

Rates of Pay—	Engi-neers.	Fire-men.
Engines weighing less than 140,000 lbs. on drivers.....	$4.75	$3.10
Engines weighing 140,000 lbs. and over on drivers.....	5.00	3.25
Mallet type engines	6.00	4.00

Engineers and firemen required to begin service other than between the hours of 6 a. m. and 8 a. m. will be paid 2 cents per hour, in addition to above rate.

Ten hours or less will constitute a day's work in switching service. Time to be computed continuously, all over 10 hours to be computed and paid for at rate of time and one-half. All overtime to be computed on minute basis.

Switch engineers and firemen will not be required to work longer than 6 consecutive hours without being allowed 30 minutes undisturbed for meals.

When road engines are used in yard service, road rates will apply.

Article V.—Preparatory Time.

Engineers and firemen in all classes of service will be allowed 30 minutes as preparatory time in addition to all other time or mileage made on the trip or day, at the pro rata rate corresponding with class of locomotive and service; provided, that on lines of railroad where rules or schedules require them to be on duty more than 30 minutes before time ordered to leave roundhouse or other point, they will be allowed one hour's time, and when required to be on duty more than one hour, actual time will be allowed. Preparatory time will be the time engineers and firemen are required to be on their locomotives, prior to time ordered to leave roundhouse or other point.

Article VI.—Terminal Delay.

Passenger Service.—Initial terminal delay for engineers and firemen in passenger service shall begin at the time they are called to leave roundhouse or other point and shall end upon departure of trains from passenger depot.

Final terminal delay for engineers and firemen in passenger service shall begin at the time they arrive at passenger depot, and will end when relieved from duty.

Freight Service.—Initial terminal delay in freight service shall begin at the time engineers and firemen are called to leave roundhouse or other point and shall end when train has passed from yard track or lead to main line, and actually departs from the terminal.

Final terminal delay in freight service shall begin when train arrives at switch leading from main line into yard, and shall end when engineer and firemen are relieved from duty; provided, that if from any cause trains are held out of yard, final terminal delay shall begin.

Engineers and firemen shall be paid on a minute basis for all terminal delay, at the pro rata rate for the class of engine used; this in addition to all time or mileage made on the trip.

Article VII.—Automatic Release and Tie-up.

Engineers and firemen arriving at terminal or end of run are automatically released; when used again, they begin a new day.

Engineers and firemen tied up between their terminals will be paid continuous time; no deductions will be made for time tied up.

Article VIII.—Held Away from Home Terminals.

Engineers and firemen held at other than home terminals (including rest period) will be paid continuous time for all time so held, after the expiration of 15 hours from time relieved from previous duty, at the rate per hour paid for the last service performed; less than one hour not to be paid for.

Article IX.—Deadheading.

Engineers and firemen deadheading on company business shall be paid at the same rate and on the same basis as the engineer and fireman on the train on which deadheading. Rules in individual schedules governing minimum day, and other conditions to apply.

Article X.—Hostlers.

At points where an average of 6 or more locomotives are handled within 12 hours, day or night, hostlers shall be maintained.

Hostling positions shall be filled from the ranks of the firemen, and they shall be paid $3.35 per day of 10 hours or less; provided, that where hostlers are required to make main line movements, they shall be paid $4.75 per day of 10 hours or less, overtime in each case to be computed on the minute basis and paid for at the rate of time and one-half.

When such main line or road hostlers are paid the same rate as engineers in switching service, such position shall be filled from the ranks of the engineers.

Hostlers shall be allowed one hour for meals between the hours of 11:30 and 1:30, day or night. Hostlers will be assigned regular meal hour between the hours named or after being on duty five hours. Should hostlers be required to remain on duty after designated meal hour, one hour will be allowed as overtime. No hostler will be required to remain on duty longer than six hours without having one full hour for meals.

Article XI.—Surprise Tests.

That the practice of conducting surprise tests by turning switch lights and placing red lights, or flags, unaccompanied by torpedoes, beside track, or wiring down automatic signals to proceed position, be eliminated.

Article XII.—Assistance for Firemen.

On all locomotives in freight service where but one fireman is employed, and on all locomotives in passenger service, coal will be kept where it can be reached by the firemen from the deck of the locomotive. Coal of the proper size for firing purposes will be placed on all tenders.

Article XIII.—Two Firemen.

On coal burning locomotives weighing 185,000 lbs. or more on drivers, when used in freight service, two firemen will be employed.

Article XIV.—Miscellaneous.

On railroads where firemen are required to clean locomotives, they shall be relieved of such service.

Where engineers and firemen are required to set up wedges, fill grease cups, or clean headlights, they shall be relieved of such service at all points where roundhouse, or shop force, or an engine watchman is employed.

Where engineers and firemen are required to place on or remove tools or supplies from locomotives, fill lubricators, flange oilers, headlights, markers or other lamps, they shall be relieved of such service at all points where roundhouse, shop force, or an engine watchman is employed.

Article XV.—Official Record of Weights on Drivers.

For the purpose of recording weights on drivers, each railroad, parties to this agreement, will permanently post bulletins at all terminals showing accurate service weights of all locomotives.

Article XVI.—Throwing Switches and Flagging.

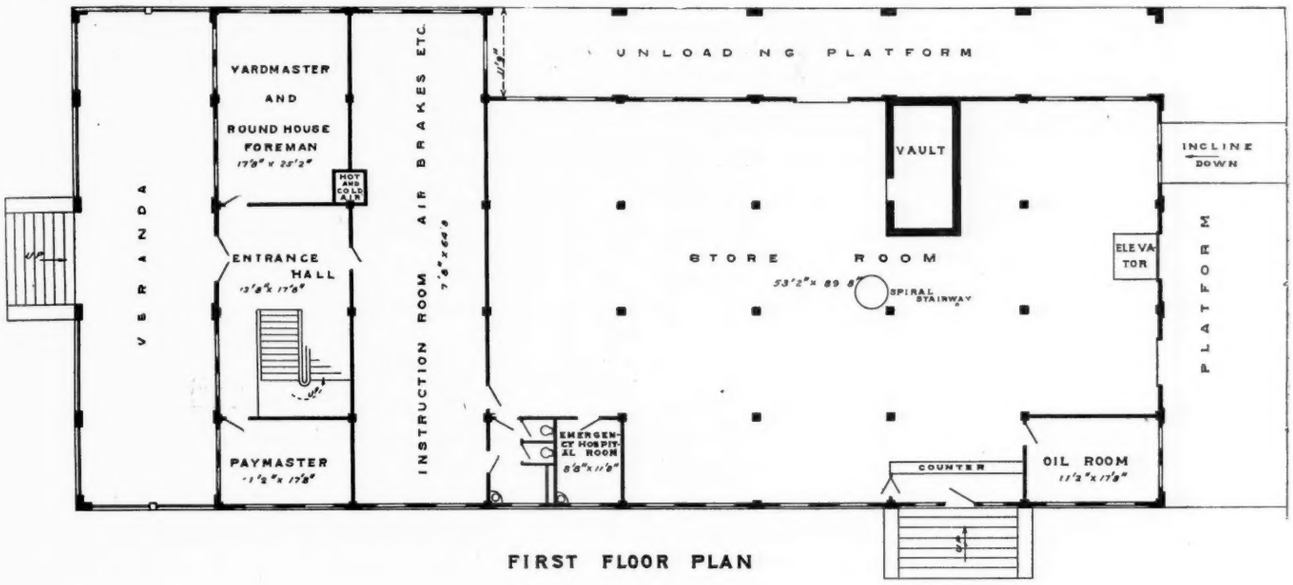
Engineers and firemen will not be required to throw switches, flag through blocks, or fill water cars.

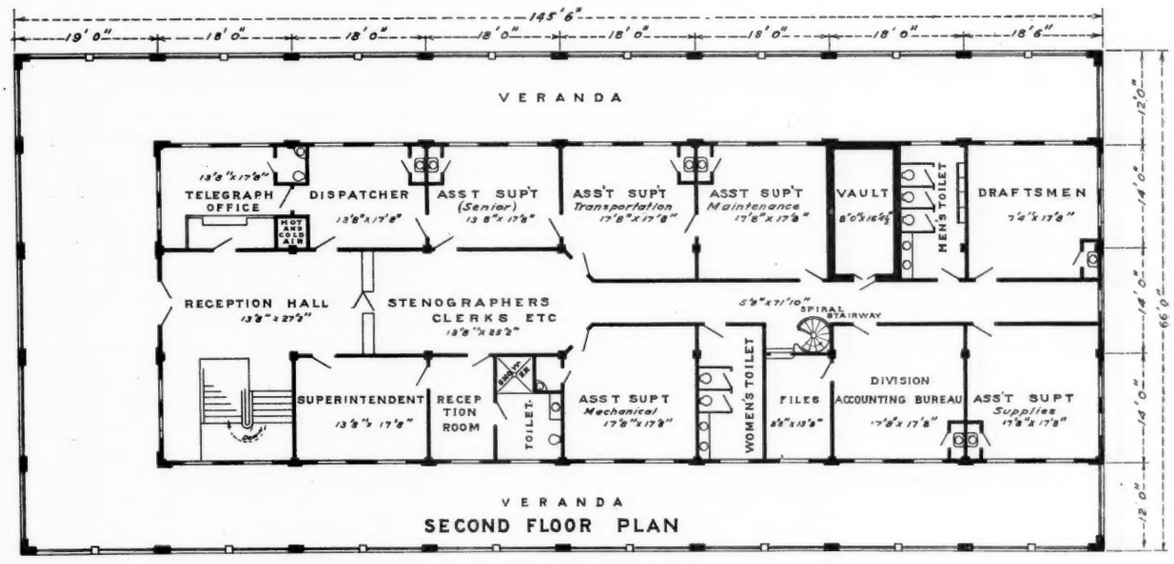
Improving Swiss Tunnel Routes.—A new line is being built between Frasne, in France, and Vallorbe, on the frontier, including a four mile tunnel, which will shorten the line of approach to the Simplon tunnel by 12 miles, thereby adding a time-saving feature to that important route. The Swiss government has also undertaken the work of finishing the second Simplon tunnel, in order to meet the demands of increasing traffic. The plans of the Simplon originally comprised two single track tunnels, only one of which was finished, however, the gallery of the second being pierced, and serving as an air shaft and for the drainage of water from the first tunnel during construction. The work now to be done consists of enlarging the gallery to the extent of accommodating a single track, thus doubling the traffic facilities and the carrying capacity of the line. A concession has been granted to the Loetschberg for a new line, which will shorten the approach and act as a feeder to the principal route from the French side. This line will cross the Jura mountains by a tunnel nearly five miles long between Moutiers, on the Basel-Delle-Biel line, and Longeau, a station on the Zurich-Olten-Biel line.

A DIVISION OFFICE BUILDING DESIGNED FOR THE HINE SYSTEM OF ORGANIZATION.

The Arizona Eastern is now constructing a new office building at Phoenix, Ariz., embodying a number of interesting features, as it is designed for use with the Hine system of organization in effect on that line. In the first place, instead of the division offices being located over the station, as is generally the rule, they are located in the division yard adjacent to the roundhouse and classification yard to increase the facilities of supervision over this most important unit of the division. This building and the first floor. The offices of the yardmaster and roundhouse foreman are located immediately off the entrance hall on the side of the building facing the classification yard, enabling the yardmaster to have a view over this yard. A bulletin board for employees will be posted in the entrance hall and an instruction room for lectures on air brake operation and other subjects is provided on the same floor. Back of this is the division storeroom with an unloading platform on the track side and a counter on the roundhouse side over which materials will be issued for the mechanical department.

The second, or office floor, is surrounded on three sides with





Floor Plans of Arizona Eastern Division Office Building.

the tracks now being built from a part of a large future development, the details of which are provided for in the present plan.

The office building is located between the classification yard and the roundhouse. It is 145 ft. 6 in. long by 66 ft. wide, of concrete construction and is two stories high with a basement. It is being built entirely by company forces. The basement will be devoted to the storage of inflammable materials with a special room for oils. A fireproof vault extends continuously through all three floors, the basement portion being utilized for the storage of torpedoes, etc.

Entrance to the building will be gained from the veranda on a veranda, essential to all office buildings in this climate. Immediately adjoining the reception hall on the side facing the yard are the telegraph and despatchers' offices where train crews will get their orders, thus bringing them directly in contact with responsible officers who are enabled to inspect the men before they leave on their runs. The senior assistant superintendent and the assistant superintendents in charge of transportation and maintenance, are located on the same side of the building, while the drafting office is located in the rear corner adjacent to the vault which is used in common with the general office for the storing of tracings and office records. On the opposite side of

the building facing the roundhouse are the offices of the superintendent and the assistant superintendent in charge of mechanical matters. The assistant superintendent in charge of supplies (storekeeper) is located in the rear, a spiral stairway connecting this floor with the storeroom proper.

The general ideas for this building were worked out by Major Hine, formerly vice-president and general manager of the Arizona Eastern, as a development of his unit system of operation. The general details of the building proper were prepared under the direction of John D. Isaacs, consulting engineer, Southern Pacific, while the detailed plans were prepared by the local division forces.

CHARACTERISTICS AND OPERATING FEATURES OF THE GAS-ELECTRIC CAR.*

By L. C. Josephs, Jr.,
Engineering Department, General Electric Company, Schenectady, N. Y.

The first consideration in the design of any self-propelled car is the size of engine required. From experience it has been found that an engine rating of from 1½ to 1¾ kw. per ton of car is about the proper amount for service in this country for cars which occasionally haul trailers. In Europe where service conditions are easier, and schedule speeds are lower, the engine equipment required is much smaller. In giving this engine rating it should be considered as the continuous rating of the engine without overheating or injury. The maximum rating of the engine for short periods may be as much as 50 per cent. more.

The generator required for a gas-electric car should be about the most flexible machine that can possibly be designed,

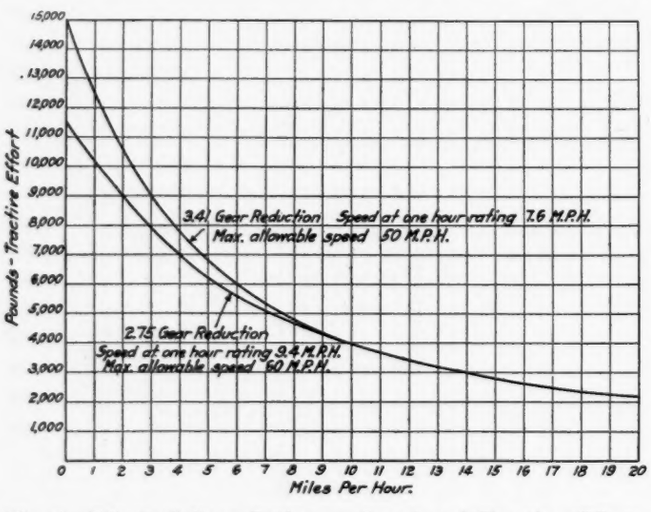

Pounds - Tractive Effort
Miles Per Hour.
3.41 Gear Reduction Speed at one hour rating 7.6 M.P.H.
Max. allowable speed 50 M.P.H.
2.75 Gear Reduction
Speed at one hour rating 9.4 M.P.H.
Max. allowable speed 60 M.P.H.

Fig. 1—Effect of Gear Ratios on Speed and Tractive Effort.

and it must be capable of operating under a wide range of speeds from 50 per cent. below rated speed to 25 per cent. above.

The current range of the generator must be from 50 per cent. below to 200 per cent. above its normal rating, and the voltage range must be from 70 per cent. below to 30 per cent. above normal voltage rating. The compounding of the generator should preferably be practically flat, and may be accomplished through the effect of the interpole field. The generator armature must be of the most liberal design. It must have a very high temperature capacity for a short time, although the continuous temperature capacity need not be great.

The proper kilowatt rating of the generator should be about 80 per cent. of the engine rating. This rating, however, has very little meaning, as when the generator is operating on high voltage with high core loss, the current is low, and the copper loss is low, and vice versa, when the generator is operating on high current with large copper loss the voltage is low, with correspondingly low core loss.

The motors used on a gas-electric car can be of the standard railway type, thus permitting the use of equipment that has proven its merits by many years of service, and simplifying methods of maintenance and inspection, but as these motors must be operated under conditions of service such as are found on the branch lines of many railroads, they must be of the most rugged construction, and capable of operating for long periods without attention.

The choice of gear ratio and wheel diameter is an important consideration. In general, for cars having 33 in. wheels and motors having an allowable maximum armature speed of 1,800 r. p. m., a gear reduction of about 2.75 is satisfactory. The choice of these various quantities depends of course on the motor used and the kind of service the car is going to operate in. The above combination is one that has been

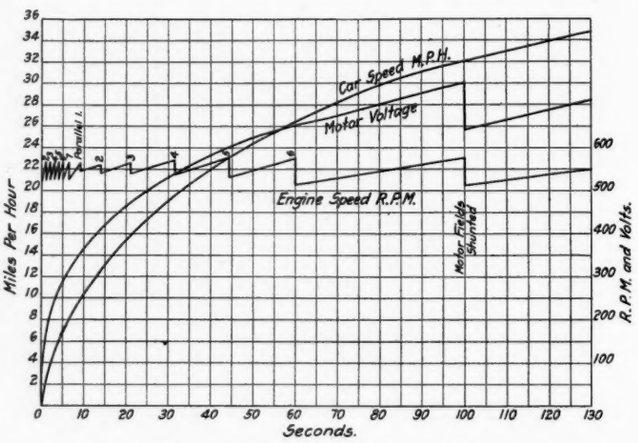


Fig. 2—Acceleration Curve for 60-Ton Car.

found satisfactory for single motor cars in average service where trailers are hauled occasionally. For 100 kw. generator output this combination gives about 12,000 lbs. tractive effort at starting, allows a maximum speed of 60 m. p. h., and a tractive effort of 4,200 lbs. at 9.5 m. p. h. at the rated load of the motors. For gas-electric locomotives and cars operating with trailers at low speeds, the maximum gear reduction obtainable is desirable. This gives slightly more tractive effort at starting, and a much lower speed at the rated load of the motors, but makes very little difference in the general speed-tractive effort relations for the equipment. To indicate how little this difference is, two curves are shown in Fig. 1 giving the speed-tractive effort relations for similar equipments having gear ratios of 2.75 and 3.41 respectively. It will be noted that above 10 m. p. h. the two curves are identical.

The motor rating on a gas-electric car should be about 125 per cent. of the generator rating. This difference is easily accounted for by the different methods of rating the two types of machines. The generator according to custom is rated on a basis of a 50 deg. C. temperature rise while railway motors are usually allowed 75 deg. C. rise.

It is desirable in a gas-electric car to have a variable speed engine on account of the added flexibility of the control. The arrangement of the motor connections may be controlled by means of the ordinary type of drum controller such as is used in trolley cars. The control of the generator shunt field current may be effected by any convenient form of field rheostat. This rheostat should best be operated by the same handle as the main motor controller. Thus, for the series motor connection the generator voltage may be brought by successive steps from its lowest point to full voltage, the

*Abstracted from a paper presented at the recent convention of the Association of Railway Electrical Engineers.

motor voltage being at all times one-half the generator voltage; and for the parallel motor connection the generator voltage may again be brought by successive steps from its lowest point to full voltage with the motor voltage now equal to the generator voltage. In practice it is found for ordinary motor car equipments that about 7 steps of voltage for the series connection of the motors, and 6 steps of voltage for the parallel connection of the motors is the most desirable combination. This gives therefore 13 different points on which the motors may be operated. Moreover, by varying the engine speed the voltage may be made to vary over wide ranges for each notch of the controller. This means a complete range of motor voltage from the lowest point of stability to the point where the generator field is fully saturated. In operating the car in order to obtain smooth acceleration, use is made of both control of the generator field and of the engine speed. This is best shown graphically by the curve in Fig. 2 showing the variation of car speed, engine speed, and voltage during the acceleration of a 60-ton car.

The idea of using a storage battery as an auxiliary on a gas-electric car has been suggested occasionally. A storage battery is primarily constant voltage apparatus and cannot be fitted into the plan of a gas-electric car without the use of relays and other parts to get out of order, unless the plan is so changed as to make the control entirely constant voltage.

PERFORMANCE.

In operating a gas-electric car care should be taken not to crowd the controller to such an extent as to allow wide variations of engine speed from the best operating speed, which is the speed of maximum fuel economy. This is best illustrated by the accompanying table, giving the car speed and tractive effort at various engine speeds on each notch of the controller. It will be noticed from this table that an engine speed of about 550 r. p. m. is the best to use, because this is the engine speed at which the tractive effort and speeds at each control notch are best distributed throughout the range of operation. At speeds lower than 550 r. p. m. several notches become worthless and at speeds higher than 550 r. p. m. the jump from series to parallel notches becomes too great.

In figuring on the service that a gas-electric car can perform there are two important points to determine; first, the schedule speed that can be made, and second, whether the service can be maintained without overheating the equipment.

TABLE OF TRACTIVE EFFORT AND SPEED.

Engine Speed.....	650		600		550		500		400		300	
Notch	T. E.	Spd.	T. E.	Spd.	T. E.	Spd.	T. E.	Spd.	T. E.	Spd.	T. E.	Spd.
Series 1.....	....	0	....	0	....	0	....	0	....	....	....	....
2.....	6800	9.5	8350	6.4	11900	2.3	4570	0	....	....	....	....
3.....	6500	10.4	7650	7.6	9950	4.1	11100	0	....	....	....	....
4.....	6060	11.4	6850	8.8	8160	6.3	10950	2.8	....	....	....	....
5.....	5600	12.7	6250	10.5	7100	8.2	8340	5.7	4580	0	....	....
6.....	5180	14.3	5740	11.9	6350	9.9	7100	7.7	10000	2.8	....	....
7.....	4480	17.1	4850	15.0	5370	12.4	5860	10.3	7330	5.7	10450	1.5
Parallel 1.....	2820	29.3	3540	21.8	5300	12.7	10450	0	....	....	....	....
2.....	2700	30.8	3260	24.3	4300	16.7	9450	4.2	....	....	....	....
3.....	2520	33.5	2890	27.6	3500	20.7	4850	13.7	....	....	....	....
4.....	2320	36.0	2590	30.8	3000	25.7	3550	19.9	10450	0	....	....
5.....	2100	40.4	2380	34.6	2640	29.5	3000	24.4	4400	13.4	4580	0
6.....	1770	48.4	1960	42.0	2240	35.8	2430	30.8	3080	20.5	4550	10.2
Shunted 1.....	1730	49.3	1960	41.3	2220	35.0	2480	28.6	3740	15.1	3900	0
Fields 2.....	1450	59.6	1610	51.3	1820	43.2	2000	38.5	2570	23.6	3860	11.6

MAINTENANCE AND INSPECTION.

In a great many ways the equipment used on motor cars is very similar to the train lighting equipment used on passenger cars, and requires very much the same kind of attention. On account of the characteristics of the gas-electric motor car and because it is able to furnish light branch line service at low cost, it is not uncommon to find motor cars operating in out of the way points at the far ends of poorly paying branch lines.

Any one who has had experience with a gas engine realizes the truth of the statement that the time to fix a gas engine is before it breaks down and not after. It has been the experience of those supervising motor cars that some large breakdown which perhaps required a day to fix was caused by the neglect of some small adjustment that could have been fixed in less than a minute by any one with a screw driver or small wrench. It is this kind of forehanded maintenance that is particularly necessary on gas electric motor cars, and it is for this reason that the instruction and examination of the operators is most important. So far as the class of labor required to operate motor cars is concerned, it has usually been customary to place on the car the steam engineer who formerly had the same run when it was steam service, and it has been found in general that a man of the caliber of a locomotive engineer is perfectly capable of making a good motor car operator, but it is absolutely necessary that he receive careful instruction, and this instruction should be of a broad nature, placing more emphasis on his understanding the equipment than his being able to answer a larger list of questions. Where things can be explained by means of parallels found in the steam engine it is of advantage to do so, but care should be taken not to stretch the truth to too great an extent so that an engineer will for example compare shunting the motor fields to the hooking up of the reverse lever on a steam locomotive.

The motor car operators should be expected to make all adjustments to their cars and to look over the engine and other equipment at the close of every day's run and make out a work report if they find work that requires attention before the following day's run. It is then usually necessary to have one of the machinists from the roundhouse or repair shop broken in to understand the motor car. This maintainer will have to make all regular running repairs. The tools he will require will be no more than the ordinary hand tools of a skilled machinist. If the work of the operator in inspecting and adjusting his equipment is of the best character the work of the maintainer will amount to little more than putting in an occasional packing blown out, or some labor of equally light nature. If the operator, however, is careless in his methods of inspection, the work of the maintainer will be correspondingly increased.

In order to check the work of the operator and maintainer it is important that a motor car should have an inspection at regular periods, and as a check, it is desirable that this inspection should be made by some other person than the operator or maintainer. The men on a modern railroad who are best equipped to make such an inspection are the electrical inspectors who look after the train lighting equipment. One of these men can be very quickly educated to understand the motor car, will usually take a keen interest in it, and can be sent at regular periods to visit the motor cars in his ter-

ritory and make the inspection of all parts both mechanical and electrical. The report made out by this inspector can be turned in to the main office as a record of the condition of each motor car from time to time.

In the discussion of the paper it was pointed out that cars should be held at their rated capacity rather than constantly taking advantage of the overload possibilities. The maintenance should be carefully watched and repairs made in time to prevent large expenditures on heavy repairs. J. E. Hilton, general motor car inspector of the Frisco, presented some very interesting figures. For the six months ending June 30, 1913, the cost of operation and repairs of seven gas-electric cars on that line averaged 18.5 cents per mile, which included the general overhauling of three cars. Some of these cars are placed in severe service with a 30-ton trailer, and have a very efficient operating record. The lowest average cost per car is 15.1 cents per mile for six months' service, with a total mileage of 30,519 miles. This car hauled a 66,000 lb. trailer during that time.

THE ECONOMY OF CAPACITY LOADING FROM THE SHIPPER'S POINT OF VIEW.

By Gordon Wilson,
Assistant Secretary, Universal Portland Cement Company.

Our annual car shortage has become a regular topic every fall, not only for the railroad magazines, but also for the trade papers, and even for the daily press. Just as surely as the morning papers on the fifth of July contain a list of the previous day's killed and wounded, so, about the time the crops begin to ripen, we begin to receive prophecies and discussions of the impending car shortage. Presently, when the famine has become an established fact, we are given the harrowing details of the loss and distress that have been caused thereby. Everyone struggles as best he can through the agonizing period of car shortage, then gives a sigh of relief and settles down comfortably as though there would never be another car shortage in all the history of the world.

There will be car shortages. There will continue to be car shortages unless the freight car equipment of this country should become large enough to handle peak loads regardless of how, when, or where they might occur. A condition of this kind, while comfortable to shippers and consignees, would be uneconomical and wrong, however, because it would mean that for months at a time millions of dollars of this country's capital would be tied up in idle cars and in tracks on which to store them. It is to be hoped that the time will come when our freight carrying equipment will be adequate, if kept in proper repair, properly loaded, intelligently distributed, and handled with proper speed, to take care of the natural movements of merchandise that occur, but in the meantime it is the duty of every good citizen to get the greatest possible efficiency out of the equipment that is available, in order that the evil effects of our car shortages may at least be minimized.

Car shortages strike first and most directly at the shipper. Therefore anything that the shipper can do to increase car efficiency is for his own immediate benefit. The advantages to be gained by getting the highest efficiency go further back, though, than the slight relief which is offered in times of car famine. As a case in point, I would like to quote a little history with which I am familiar. In 1911 the average load per car shipped by the Universal Portland Cement Company was 67,640 lbs., in 1912, 70,300 lbs., and for the first eight months of 1913, 73,606 lbs. These increases of about 3,000 lbs. per car per year may not seem to be very significant, but if we had not increased our average loading in 1912, we would have required 2,132 cars more to take care of the number of barrels of cement that we shipped in that year. Figuring on the same basis, our saving for the first eight months in 1913 is 3,307 cars as compared with our 1911 record, and 1,758 cars as compared with the improved record that we made in 1912. In other words, through the simple expedient of getting greater efficiency out of the cars that we load, we have been able to release over two thousand cars a year for the use of other shippers, not only without hurting ourselves in any way, but actually to our own advantage.

There is a certain amount of unproductive expense attached to the loading of every car. Each car has to be cleaned and prepared for loading. After a car is loaded it has to be pinched down the track from the loading door and another car spotted in its place. During this time the shipping crew stands idle. The cost of the time of a gang of men for the period required to move out a load and replace it with another empty is well worth consideration. Multiply it by the number of cars that have to be loaded in the course of a month, and it amounts to a figure that is worth while trying to cut. If the amount of product to be shipped in the course of a month can be loaded into a smaller number of cars, the cost of loading, per unit of product, is correspondingly reduced, and incidentally the profit per unit on the material is correspondingly increased.

This is a plea for capacity loading twelve months in the year. If the cars that are shipped in the spring and early summer can be loaded heavier than they have been, the manufacturer will have a smaller proportion of his year's output to ship during the latter months of the year when the cars are not so plentiful. His goods will already be at the market instead of in his warehouse at his factory. The habit of capacity loading will have become established, so that fewer cars will be required to take the product that still remains to be shipped, and if this condition could be made general, there would be more cars available. The customer whose shipments are delayed time after time on account of car shortage will be given larger shipments when he does get them, and these larger shipments to the customer will carry him for longer periods of time between the placing of orders.

A great deal of the underloading of cars is due to habit or thoughtlessness. People who began to order in carload lots when fifteen and twenty ton cars predominated are still placing fifteen and twenty ton orders, although thirty, forty and fifty ton cars have become the standard equipment. On the same principle, we have found that one of the most common causes of lost car efficiency is the habit of thinking in round numbers. A man would order a car of 100, 150, or, maybe, 200 barrels. Cement manufacturers themselves, when shipping capacity loads, were shipping cars of 170, 230, or 280 barrels, in spite of the fact that these same cars, when loaded to the limit of their capacity plus 10 per cent., would carry 173, 231, and 289 barrels, respectively. A great part of the improvement that we have made in the weight of our average carload, as noted above, has been due to the fact that we and our customers have stopped thinking in round numbers—in multiples of ten—and have given a great many cars the exact limit of the load that they can carry. Of course there are cases when full capacity loads cannot be shipped, and there are times when a concern that is endeavoring to do its share towards increasing car efficiency will be suspected of ulterior motives, but in general it has been our experience that the average consignee will readily appreciate the importance of this car efficiency movement, and will gladly render his aid in furtherance of it. One of our salesmen was presenting this subject to a customer who had always ordered his cement in carloads of 150 barrels each. The customer agreed that he was wasting a part of the service of every car that he ordered, but explained that his warehouse would hold only 150 barrels. "All right," said our salesman, "let us load this car to 173 barrels, and when you get your notice of shipment, go out and sell a wagonload to be hauled direct from the car as soon as it gets in." This suggestion solved that dealer's problem, and ever since then his orders have called for cars of 173 barrels.

NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS.

The twenty-fifth annual convention of this association was opened in Washington on Tuesday of this week, and Chairman E. E. Clark of the Interstate Commerce Commission welcomed the members to Washington. After a brief reference to the progress of the past dozen years, Mr. Clark said:

We all occupy positions of tremendous responsibilities and are invested with unprecedented authority. Upon our zeal, patriotism, efficiency and judgment, rests largely the commercial welfare of our country.

In this as in other lines of public work, we find extremists on both sides, who, unless their ideas are accepted and followed, exercise to its full extent the American's prerogative of criticism. Their criticism is often founded in lack of knowledge as to facts, and sometimes in a willingness to disregard the rights of others. Such criticism creates misunderstandings and misconceptions, but if we are not broad enough to refrain from being influenced or swerved by it, we are lacking in true capacity and fitness for the positions which we occupy.

The situation that existed when regulation was undertaken was permitted to grow up. State and nation could have prevented it. But it was a long time before public sentiment, which is really the power of the state and of the nation, awakened to the facts, and roused itself to the task of establishing equity in place of gross and unjust discrimination, and law in place of license.

The multitude of evils could not be eliminated nor the wrongs corrected by one heroic action. Under the conditions that then existed such things grew rapidly and easily. The attempt to eradicate them involves the interests of many who had nothing to do with creating or fostering them, as well as the interests of the carriers, whose agents, in co-operation with the representatives of favored ones, created and nourished the wrongs.

Even if it be true that the present financial condition of transportation agencies is due to reckless, improvident, or even dishonest financing in the past, it would be a mistake to undertake to correct it by a policy of reprisal which will impair the usefulness or efficiency of the carriers upon which the welfare—the very life—of the commerce of the country depends. That commerce grows continually, and we have seen, each year, periods during which the available facilities were sadly lacking in capacity and efficiency to properly furnish the transportation demanded.

This is in part due to the failure of carriers to provide themselves with facilities; in part to inefficient handling and movement of equipment; in part to failure of shippers and receivers to provide room and facilities of their own sufficient for their needs, and in part to customs that have grown up in some lines of business which necessarily cause serious delay to cars and congestion of terminals.

Of course, the ideal situation would be one in which the carriers were ready to provide all the equipment needed and promptly transport all the traffic offered at the time of the maximum demand; but that situation can be attained only by large additions to the facilities and great improvement in methods. The added facilities can be secured only through expenditures from surplus earnings or from expansion of credit. In either way the total cost to purchasers of transportation would be increased. It seems to me that no more helpful work can be done than to bring about the highest possible degree of efficiency in the operation and utilization of the facilities now possessed.

It seems to me also that the traveling public is justly entitled to a greater degree of safety while patronizing our railroads. The importance of this should be brought forcefully to the mind of every railroad official and every railroad employee. They should realize and respond to the great responsibilities which they have undertaken and be held to a strict accountability for neglect therein. It would be well to revive and enforce the old and fundamental rule for train operation, "In case of doubt, take the safe side."

RAILWAY ELECTRICAL ENGINEERS' ASSOCIATION.

An account of the opening exercises and committee reports of the first two days of the convention of the Association of Railway Electrical Engineers, was published in our last week's issue on page 756. Extracts from other reports of interest follow:

CAR ILLUMINATION.

L. S. Billan, chairman of the committee, presented the report. An abstract follows: The committee arranged with the co-operation of the Lake Shore & Michigan Southern and with the assistance of the manufacturing concerns directly interested in the subject, to conduct an extensive series of tests on day coach lighting. The tests were held at the Collinwood shops of the Lake Shore at Cleveland, employing a modern 70 ft. coach for the purpose, and lasted about eight weeks. They covered an investigation of the relative engineering merits of center deck and half deck system of location of units, their proper spacing, the efficiency, illumination intensity, and uniformity of all distinctive types of lighting units for both gas and electric lighting suitable for this service. From the results the committee has drawn the following conclusions:

First: Equally satisfactory illumination results from the point of view of efficiency, uniformity of distribution, and absence of objectionable shadows (except where a large number of people are standing in the aisle) are obtained with either the center deck or the half deck arrangement of light units. However, on account of the larger number of units involved, cleaning cost, reflector and lamp maintenance are materially greater with the half deck arrangement.

Second: The uniformity of distribution of illumination obtained with spacing the lighting units three seats (approximately 9 ft.) apart is so poor as not to justify spacing greater than two seats (approximately 6 ft.) where the best illumination results are desired. This does not apply to semi-indirect or indirect lighting where an entirely satisfactory distribution can be obtained with three seat spacing.

Third: With direct lighting systems the color of the head lining has no appreciable effect on the useful illumination produced, except where lighting units are used in which a considerable proportion of light is transmitted to the ceiling. The use of a light colored head lining, however, is recommended, as it produces a more cheerful effect in the car than where a dark color is used.

Fourth: The results of illumination tests show a wide range in the efficiency of the lighting units, the more efficient units producing over twice the useful illumination, compared on an equal wattage basis. Further, the various lighting units can be classified into groups each possessing distinctive characteristics. Table I shows a comparison of the groups with reference to their illumination efficiency.

Fifth: The illumination values obtained with electric lighting show the desirability of the use of a lamp of greater lumen capacity. Until such a lamp can be available without an increase of its wattage above the present standard train lighting lamps, the use of only the more efficient types of lighting units is recommended where the best results are desired.

Selection of System.—In determining the suitability of any system of illumination for passenger carrying cars consideration should be given to the following features, which are stated in the order of their relative importance:

Quality of illumination produced relative to permitting the

eye to see with the least amount of fatigue or discomfort; efficiency and uniformity of distribution; cleaning costs; reflector breakage costs; artistic merit, and fixture installation and maintenance costs.

Bare electric lamps should never be used for general illumination in railway cars, as the high intrinsic brilliancy of the filament makes them very irritating to the eye as well as produces eye fatigue. In addition the efficiency of the bare lamp is very low, the illumination produced on planes where used by passengers with the arrangement and sizes of lamps (half deck system with 15-watt lamps) in use to a considerable extent being but slightly higher than that obtained with some of the better forms of oil lamps. Also the use of a shallow bowl type of reflector should be avoided in which the bare light source can be seen within the normal angle of vision of a passenger when standing in the aisle or sitting in a seat.

Recent tests which have been made, though not of sufficient extent to be entirely conclusive, would indicate that eye fatigue is but slightly reduced with diffuse illumination, as produced by direct lighting units of diffusing type or with semi-indirect lighting units, from that produced with the majority of types of direct lighting units employing open reflectors.

The various kinds of lighting units can be classified in groups possessing more or less distinctive characteristics. Table I shows such a grouping as based on their illumination efficiency, the different types being arranged in the order of their efficiency as measured on the 45 deg. planes. Center deck lighting with two seat spacing was used with all but the semi-indirect and totally indirect lighting units, which were spaced three seats apart.

TABLE I.—ELECTRIC LIGHTING.

Comparison of Various Types of Lighting Units from Point of View of Illumination Efficiency.

All results reduced to same total wattage representing 66⅔ generated lumens per running foot of car.

Type of Unit.	Average illumination on 45 deg. reading planes, foot candles. Aisle seats.	Window seats.	Avg. seats.	Illumination efficiency, per cent. effective lumens on 45 deg. planes.
Open mouth reflectors—				
Mirrored glass reflectors	3.39	2.18	2.79	39.5
Prismatic clear reflectors	2.66	2.17	2.42	34.2
Heavy density opal reflectors	2.41	1.87	2.14	30.3
Enclosing unit—				
Prismatic reflectors (deep bowl type) and bowl	2.15	1.66	1.89	26.7
Open mouth reflectors—				
Medium density opal reflectors	2.00	1.65	1.83	25.9
Prismatic satin finish reflectors	1.94	1.50	1.72	24.3
Light density opal reflectors	1.79	1.52	1.66	23.5
Semi-indirect units	1.56	1.24	1.40	19.8
Diffusing shades (standard Pullman opal shade)	1.42	1.28	1.35	19.1
Enclosing units—				
Reflecting and diffusing globes (satin finish Corona)	1.44	1.24	1.34	19.0
Reflecting and diffusing type of units.	1.46	1.18	1.32	18.7
Prismatic reflector (shallow bowl type) and bowl	1.39	1.09	1.24	17.5
Totally indirect units	1.36	1.11	1.23	17.4
Bare lamp	1.17	1.13	1.15	16.3
Enclosing unit, light density opal globe.	1.09	.97	1.03	14.6

As would be expected, the mirrored glass type of reflector is the most efficient, but on account of being opaque its use can scarcely be considered for direct lighting units for coach service. The clear prismatic type of reflectors come next, followed closely by heavy density type of opal reflector; in fact, one of the deep bowl heavy density opal reflectors tested showed a slightly higher efficiency than a similar shape of clear prismatic reflector. While the illumination from the heavy density opal type falls off at the window seats considerably more than from the clear prismatic type, its efficiency is so high that it should possess considerable attraction for those who object to the appearance and the cleaning question involved of the clear prismatic type, but do not wish to sacrifice efficiency.

Next in order of efficiency is an enclosing type of unit. The units of this type tested consisted of clear prismatic glass reflector (deep bowl design) with prismatic enclosing bowl, both with and without opal glass envelopes over the reflectors. On account of their higher first cost as well as maintenance costs when compared with open mouth reflectors, their use for day coach lighting would probably be considered prohibitive by most railroads. However, for parlor cars, sleeping cars and similar classes of equipment where it is desired to use lighting units in which the bare light source is entirely concealed and the glare reduced to a minimum yet at the same time possessing high efficiency, this type of unit is to be recommended.

The low efficiency should be noted of the square opal shades recently put in use on Pullman cars. Though higher than that obtained with the sand blasted shades in general use on these cars, they are lower than that obtained with the semi-indirect type of lighting units tested and about equal to that of the satin finish Corona globe extensively used with gas lighting in coach service.

With the exception of the deep bowl reflector type of prismatic glass enclosing unit specially designed for car lighting there was found to be relatively little difference in the efficiencies of the different types of enclosing units tested whose use has been considered to any extent for car lighting service. These units showed but little higher efficiency than indirect lighting without possessing the advantages of that system.

As might be expected, with the comparatively small ceiling area available for reflecting purposes, except in a few forms of passenger car construction, the efficiency of the indirect lighting system is rather low. Except for a few special cases in passenger car lighting where the questions of efficiency and the cost of a very high standard of cleaning both of the lighting units and the ceiling of the car, are of minor importance, the indirect system of lighting cannot be recommended for general use in passenger car lighting until a decided advancement has been made in improving the efficiency of the tungsten lamp.

The fact that because the character of material or form of construction of the lighting unit identifies it as belonging to one of the groups shown in Table I, is not sufficient evidence from which to assume that its illumination efficiency in similar service will correspond to that given. It is essential that the shape of its photometric curve and the lumens produced in the different zones approximate that obtained with the units used in the tests.

Gas Lighting.—The variety of lighting units for gas lighting has never been developed to the extent it has for electric lighting. Table II shows the illumination results and efficiency obtained with some of the lighting units in general use for railway service. The data is on the same basis as that given in Table I except that it represents 130 generated lumens per running foot of car (Pintsch 90 candle power mantle lamps on two seat spacing) instead of 66⅔ lumens.

TABLE II.—GAS LIGHTING.

Comparison of Various Types of Lighting Units from Point of View of Illumination Efficiency.

Results given on basis representing 130 generated lumens per running foot of car.

Type of Unit.	Average illumination on 45 deg. reading planes, foot candles. Aisle seats.	Window seats.	Avg. seats.	Illumination efficiency, per cent. effective lumens on 45 deg. planes
Enclosing units—				
Prismatic reflector and bowl, deep bowl type	3.65	3.72	3.69	26.8
Reflecting and diffusing globes (clear Corona)	2.74	2.34	2.54	18.4
Reflecting and diffusing globes (satin finish Corona)	2.47	2.07	2.27	16.5
Medium density opal diffusing globes.	2.08	1.52	1.80	13.1
C. R. I. diffusing globes	1.92	1.67	1.80	13.1

The prismatic reflector and bowl unit was practically identical with that used in the tests with electric lighting. As was shown with electric lighting, the efficiency of the reflecting

and diffusing type of globes is low. However, on account of the large amount of light produced by gas lamps, the need for using efficient reflectors is not as great as with electric lighting.

Size of Lamps.—It will be noted that with the best arrangement of location of lighting units—center deck lighting with two seat spacing and employing the largest standard size of train lighting lamp in general use, the 400 lumen lamp (50-watt)—the illumination obtained on the 45 deg. reading planes is not as high as could be desired, except possibly with the most efficient types of reflectors. The need of a train lighting lamp of higher lumen capacity is indicated, but at the present time none is available except at an increase in wattage, which from an operating point of view is highly undesirable. With the present standard train lighting lamps, therefore, the use of only the more efficient types of lighting units is recommended for electric lighting where the best illumination results are to be obtained.

The discussion brought out the fact that the lamp manufacturers have progressed to such a stage that they will soon be able to make some very pronounced improvements. The question was raised as to whether watts or lumens should be the standard on which to classify lamps. Whichever standard is chosen it should be the real standard and adopted by all railroads.

TERMINAL FACILITIES FOR LIGHTING EQUIPMENT.

The report of the committee on this subject was restricted to the description of battery houses with the tools required and the methods of handling the storage batteries to and from the car. The discussion, however, brought out the question as to where the general overhauling of the batteries should take place. Some favored the general car shops, while others favored the terminal coach yards. It was evident that different conditions governed this point. On the Pennsylvania lines east all the batteries are cleaned at one terminal and are not necessarily restricted to the shopping of the car. When the cars are shopped, however, the batteries are taken from the cars and carefully inspected, light repairs being made. The heavy repairs are sent to the main battery repair plant and new batteries substituted. It was found that this work, if distributed amongst various shops, would prove very expensive and that the batteries should not be restricted to car shoppings as the periods of service between shoppings were very different from those of the car. On the New York Central, however, the batteries are cleaned at the main car shops when the car goes in for general repairs, and those batteries not ready to be shopped are taken from the shopped cars and exchanged with those batteries of other cars which are in a bad condition.

CHARGING STORAGE BATTERIES.

The committee on this subject presented practically the same report as was presented at the semi-annual convention at Atlantic City last June, being abstracted in the *Daily Railway Age Gazette* of June 17, on page 1428. The members considered in the discussion the question of wiring the charging receptacles throughout the yard in series or in parallel. It was pointed out that the series system was a very unsatisfactory way in which to charge batteries, and should not be used in any case where the multiple system could be used. The multiple system is much more expensive, but saves considerable in the life of the battery.

OTHER BUSINESS.

The following officers were elected for the ensuing year: President, C. R. Gilman, chief electrician, Chicago, Milwaukee & St. Paul; first vice-president, H. C. Meloy, chief electrician, Lake Shore & Michigan Southern; second vice-president, E. W. Jansen, electrical engineer, Illinois Central; secretary-treasurer, Joseph A. Andreucetti, general foreman, Chicago & North Western. It was voted that the next annual convention be held at Chicago, and that San Francisco be considered for the semi-annual convention of 1915.

General News.

The United States Civil Service Commission announces examinations for telegraph and telephone engineer, senior and junior, and for telegraph and telephone inspector for service under the Interstate Commerce Commission in valuation of the property of common carriers.

The Rock Island road has increased the pay of telegraphers five per cent., following protracted negotiations with the employees. Points at issue were adjusted October 28, after conferences conducted through G. Wallace W. Hanger, assistant Federal commissioner of mediation under the Newlands act.

Pierce Butler, of St. Paul, and ex-Governor Herbert S. Hadley, of Missouri, have been retained as joint counsel for the western railways in connection with the valuation of railway property now being made by the Interstate Commerce Commission. Mr. Butler was counsel for the railways in the Minnesota rate case, and also acted as special counsel for the government in the litigation against the meat packers.

About 80 per cent. of the Pullman cars now in operation on the New Haven road are either all steel or of steel underframe and steel end construction, and the Pullman Company has assured Chairman Elliott that by December 31 every Pullman car in use anywhere on the New Haven's lines will be of that character. For some time practically all the sleeping and parlor cars running between New York and Boston have been steel or steel underframe.

The Chicago city council committee on railway terminals has decided to postpone for two weeks final consideration of the report made by John F. Wallace recommending the passage of ordinances asked by the Union Station Company for its proposed passenger terminal and by the Pennsylvania lines for a new freight terminal. This action was taken at the instance of the railways interested, they having asked that the committee await the independent investigation of the terminal question being made by Bion J. Arnold at the expense of a citizens' committee.

The Pennsylvania has discovered a somewhat extensive scheme for selling forged certificates of satisfactory former employment on railroads. Most of the forged letters that have been located so far have purported to come from the Schuylkill division, and they have been presented by applicants in California. The proprietor of a cigar store in San Francisco made a charge of $1 for a forged letter of recommendation. He had an accomplice in a stenographer in a shop nearby, who, for the sum of 25 cents, would add a few pencil notations to give a letter some look of genuineness. The forged letters first appeared in the summer of 1912, and since then have been appearing with considerable frequency.

The *Railway Age Gazette* denounces noise nuisances at all times and in all places; but as an impartial chronicler of events it must give place to every bit of pleasing evidence about railroad noises, whatever may be its source; and we therefore reprint the following item from the Macon (Ga.) *Telegraph:* For a railroad passenger train's whistle to practically suspend business in a town, and also to run ripples of pleasure over the countenance of a Sunday morning congregation, is something out of the ordinary. Yet that is what the Central of Georgia has done for its Eatonton patrons. So delighted are the citizens along the route of the road that a petition is being spoken of, requesting the Central to keep the whistle in service. [It is a "calliope" whistle.]

The Gray-Thurber automatic train stop, which has been installed for experimental purposes for some time on the Pennsylvania Lines West, near Pittsburgh, was demonstrated before a party of railroad officers on Thursday, October 23. The installation comprises four stop locations on one track. The automatic apparatus is superimposed on the automatic block signal system with which the road is equipped. The special demonstration train followed a local train into the successive blocks and was stopped automatically at each stop signal. Tests were made at speeds varying from 10 to 50 miles an hour, with satisfactory action in every case. On the afternoon of the same day

there was a demonstration on the line of the Pittsburgh (electric) Railways where an electric car has been equipped. The Gray-Thurber company expects to give a demonstration this week in the presence of a committee of Congress. Sixteen Congressmen have promised to be present.

Tippers Called to Account.

The notice reprinted below has been posted in the waiting rooms and corridors of the Union Passenger Station at Portland, Oregon. We are informed that this action has been taken because the tipping evil has grown to be a great annoyance; to such an extent that travelers are embarrassed at every turn through having attentions thrust upon them which they do not desire, but under such circumstances that they hand over a tip rather than appear close or niggardly in the eyes of the porters or of fellow travelers. Others who really require assistance refuse it, feeling that they cannot afford to pay what the porter is supposed to expect. An officer of the company advises that similar action is expected to be taken at all of the other important passenger terminals on the Pacific Coast—Los Angeles, San Francisco, Tacoma, Seattle and Spokane.

NORTHERN PACIFIC TERMINAL COMPANY OF OREGON

GRAND CENTRAL STATION.

Notice to Passengers

Please do not offer tips to Red Cap Porters or other employes in this Station.

The service is provided and paid for by the Terminal Company as a convenience to the public and all employes are prohibited from receiving tips.

London & Port Stanley to Be Electrified.

The city of London, Ontario, which owns the London and Port Stanley Railroad, twenty-four miles long, from London southward via St. Thomas to Port Stanley, on Lake Erie, has decided to introduce electric traction, and to operate the road directly. This is the result of a vote of taxpayers taken October 22. The estimated cost of the changes to be made is $700,000. The vote was 2,820 in favor of electric traction and 2,574 against it. This road appears in the Official Guide under the head of Pere Marquette, with a notation that it is operated by the Lake Erie & Detroit River Railway Company.

Facilities Versus Hostilities.

As one of our exchanges very aptly puts it, "Texas needs railroad facilities far more than railroad hostilities." The railroads have so long been the stepping stone of ambitious politicians that it is about the only chartered route to fame and power.

As long as the state rages and frets and bites at the chains of progress there will be a deathlike stillness over our affairs while we weave our own sorrow; but if we are going to make footprints in the sands of time, it will take something more than hostility toward industry to do it. We need railroad facilities instead of railroad hostilities.—*Bulletin of the Texas Commercial Secretaries' and Business Men's Association.*

Seniority Not a Presumption of Fitness.

Railroad managers are held responsible by the public and it is from the managers that the public expects whatever action is necessary for safety. The public, through Federal and State commissions, has called on the New Haven road for adequate regulations for the selection of competent men to operate the trains. It is reasonable and just for the public to expect that the management shall be free to take that action. The management has issued new regulations, which make seniority only one of the factors, instead of the chief factor, in determining fitness. In this the management is acting on sound principles. Seniority does not necessarily insure fitness. This is equally true in the army and the navy. It is not necessarily even a presumption of fitness. Whatever danger there is of favoritism must be guarded against in some other way than by the impracticable and rigid application of a seniority rule.

This is not a defense of absolutism in railway management. If there is injustice, the men ought to be heard, by appeal to a body that represents the interests of the public. There is but one answer to the question, Who is responsible for the safety of passengers on the railway? It is the management. Wise self-interest, as well as public spirit, should impel the employees of the railway to do nothing which will impair the responsibility of the management by impairing its freedom to command and direct its forces.—*The Outlook.*

Safety First on the G. T. R.

The Grand Trunk Railway of Canada, on which George Bradshaw has been promulgating "safety-first" ideas, has issued a placard 10 in. x 6½ in., the substance of which is reprinted below. The lettering is blue and red on white cardboard—a red, white and blue effect. At each corner, in the border, is a print of the safety first button.

GRAND TRUNK RAILWAY SYSTEM.

THE PLEDGE.

I will Railroad according to the Book of Rules. I will do all in my power to guard against unsafe acts on my part. If I see a fellow employee doing his work in an unsafe manner, I will speak to him, as a friend, and use my moral influence to have him perform his duties in the Safest Possible Manner. I will remember and practice at all times SAFETY FIRST.

EIGHTY-THREE PER CENT. of all persons injured on railroads are YOU MEN WHO WORK FOR THE ROADS. SIXTY-SIX PER CENT. of all preventable injuries sustained by you are DUE TO UNSAFE PRACTICES which you could avoid.

Different Degrees of Danger.

Individual drinking cups will not help greatly if the water to be drunk out of them is contaminated, and the charge of Surgeon-General Blue that a great railway company has been supplying its trains from a source polluted with sewage suggests that society may have become prematurely refined about details which are of secondary importance and which may easily distract attention from the vital point. The public drinking cup is not a nice thing and may involve some risk of infection; but a small risk in comparison with the dangers of breathing public air. The drinking-cup reform is praiseworthy but not very important; in comparison with the quality of the liquid which the cup contains it is insignificant. Travelers who otherwise would control their appetite for water are liable to take it for granted that the public health has been safeguarded in every particular.—*Springfield Republican.*

Two Months for Manslaughter.

Engineman Caudle, who was held responsible for the rear collision at Aisgill, on the Midland Railway of England, on September 2 (the date of the last railroad disaster in this country), has been sentenced by the court at Carlisle, Scotland, to two months in jail, on a charge of manslaughter; "a nominal penalty," says the despatch. Caudle admitted running past signals set against him, but nevertheless the trade unions are declaring that he has been made a scapegoat, and that the officers of the railroad company are at fault. The claims of the unionists are based on alleged difficulties because the engine was overloaded. Caudle asked for a helping engine, but the request was refused. The coal supplied is alleged to have been so bad as to necessitate incessant stoking and oiling; and attention to the injectors, made necessary by the condition of the engine, monopolized the attention of both engineman and fireman at critical moments. The judge ruled that Caudle accepted all the responsibility, despite these circumstances. The trades unionists retort that he had to do this or lose his job. Caudle passed a caution signal while, or just after he was outside the cab. He had gone around the front of the engine to oil around.

Tom Straw.

The Railroad Young Men's Christian Association, at Haileyville, Okla., on the Rock Island, reports that 95 per cent, of the locomotive engineers running into Haileyville make use of the building; also 80 per cent. of the conductors, 85 per cent. of the firemen, 60 per cent. of the brakemen and 50 per cent. of the switchmen. Testimonials from these men have been given as follows:

Engineer: "A man who would not appreciate what the Rock

Island has done for us in the gift of this building would not appreciate his own mother."

Engineer: "I never had any use for a Y. M. C. A.—the fact is I never had been in one. Now I have two homes, one at the other end of the line where I live and here at the Railroad 'Y.' It is a second home to me."

Conductor: "I had put up with conditions as long as I could possibly stand and was looking for a change to some other section of the country. Now I have decided to stay."

Brakeman: "I have not boozed any since the 'Y.' opened, and spend all my time in the building."

Fireman: "The porch alone is worth the price of a year's membership."

Railroad Clerk: "Life is not quite so monotonous now. I was going to quit and go north; but me for Haileyville."

Fireman: "This secretary, Tom Straw, has shown me that I have been living on a mighty low plane. I tell you clean surroundings, a decent place to play pool, a good bed, good, wholesome food, goes a long ways toward helping a man to keep straight. Why, I even wash cleaner than I used to."

Brakeman: "My wife is a booster for the Railroad Y. M. C. A. She says since I have been stopping here I actually cuss less and treat the children and herself the way I did during the first years of our married life."

Engineer: "No man can imagine what a new man this building makes of a fellow. I used to be always tired and fussing when I came from a run. Now I feel ten years younger."

A Minister: "A better moral tone already prevails in our community."

A Business Man: "We have begun to realize how narrow we were and on what a low plane we were all living. This secretary, Tom Straw, is the biggest asset Haileyville has. Where do you get such men for your Y. M. C. A. work?"

Switchman: "I am taking a new interest in my job. 'Taint quite so stale around this burg now."—*Rock Island Employes' Magazine.*

Trains Need Not Be Delayed for Late Mail.

Postmaster General Burleson has issued an order amending Section 1354 of the new edition of the postal laws and regulations to provide that where the holding of a train for the loading of mail from a delayed connection would seriously delay the train, the department may authorize its departure when the letter and daily newspaper mails have been loaded if a subsequent available train is due to depart within a reasonable time. It is also provided that at points where trains are held for mails from connections during the weighing period, upon the results of which adjustments of pay on the routes are based, the railroads will be required to maintain the conditions with respect to holding the trains that obtained during such weighing periods.

This change of the regulations has been advocated by the railroad companies for a number of years and only a few months ago the matter was presented to the department by a committee representing several of the railroads, but no action was taken until recently when it was brought to the personal attention of Mr. Burleson by Guy Adams, manager of mail traffic of the Frisco Lines and the Chicago & Eastern Illinois, who represented that the schedules of passenger trains throughout the country were being seriously interfered with because of holding trains at certain points for the loading of all the mail, on account of the enormous quantities of parcel post packages. After careful consideration of the matter, the regulations were changed, thus removing restraints upon the expeditious operation of passenger trains and at the same time duly subserving the best interests of the postal service.

Investment Bankers' Association.

The second annual convention of the Investment Bankers' Association of America was held on October 28, 29 and 30, at the Blackstone hotel, Chicago. Papers on railroad subjects read at the convention include "Railroad Bonds and Equipment Notes," by George G. Henry, of New York, and "Railroad Bonds," by John E. Blunt, Jr., vice-president, Merchants Loan and Trust Company, Chicago. At the banquet on Thursday evening James J. Hill delivered an address dealing with present conditions in the investment world, an abstract of which appears in another column. In his address as president of the association, George B. Caldwell, of the Continental & Commercial Trust & Savings Bank, Chicago, spoke on the subject of "Railroad Financing" as follows:

We have, during the past year, been brought face to face with a new form of railroad financing. The plea of the railroads for higher rates because of decreased profits apparently does not strike the popular mind with the same force as the suggestion that the public safety and convenience require large capital outlays for automatic signals and steel cars, better track and stations; and that to raise that capital the railroads must show a good margin over their fixed charges and fair dividends. There is another side to this question on which the railroads must be alert. They must offer new capital issues with the best of security at their disposal. Short-term notes, convertible bonds, equipment issues, all at high rates of interest and requiring refinancing and duplication of bankers' commissions, lawyers' and other fees and expenses, have for a long time been liberally supplied in the attempt to effect a slight saving in the interest rate. The money is obtained at high rates, but responsibility for really financing the companies is only deferred, and later long-term issues must be negotiated. Still another experience is now being faced by many roads which have exhausted their prior lien bond issues and have been forced to other kinds of secondarily secured issues, instead of creating a blanket mortgage sufficiently comprehensive to provide for the entire system, amply secured by present and future property and resources. If a company has any credit, such mortgage bonds under clearly drafted measures as to the purposes for which they can be issued, should net far better prices than any attempts to use miscellaneous forms of security issues which have nothing to commend them but the small aggregate amount of the mortgage or indenture covering their issue, which is exhausted in about twenty years, and then drives the company to further creations of sectional or divisional mortgages. Some of the companies have awakened, such as the Chicago, Burlington & Quincy with its $300,000,000 mortgage, the Great Northern under Mr. Hill's foresight with a $600,000,000 mortgage, the Interborough Rapid Transit with one for $300,000,000, the Southern Railway for $300,000,000, the Pennsylvania for $1,000,000,000, and the New York Central with a mortgage having no fixed principal sum except a limitation of not exceeding three times the par value of the capital stock at any time outstanding, which it hopes to have authorized. It is the opinion of railroad experts that it will result in cheaper financing and a stronger form of security, eventually becoming the first lien on the system. The first mortgages on most roads are now exhausted, or nearly so, and this broad basis for future comprehensive railroad financing must become the rule and not the exception. The creation of mortgages for railroads and public utility companies for larger amounts than in the past must be expected if the country is to be well served. The investor and dealer alike should appreciate a standardization of methods of financing, as well as forms of mortgages.

Car Foremen's Association of Chicago.

The annual election of officers of the Car Foremen's Association of Chicago, held October 13, 1913, resulted as follows: President, George F. Laughlin, general superintendent, Armour Car Lines; first vice-president, C. J. Wymer, general foreman, Belt Railway; second vice-president, A. Le Mar, master mechanic, Pennsylvania Railroad; treasurer, M. F. Covert, assistant master car builder, Swift & Company; secretary, Aaron Kline, 841 North Fiftieth court, Chicago. The election was followed by a banquet, vaudeville and dance. The association is in a prosperous condition, having a membership of 876 practical car men.

American Railway Association.

W. F. Allen, general secretary, 75 Church street, New York, announces that the fall meeting of the American Railway Association will be held at The Blacktsone, Chicago, November 19. Reports will be presented by the executive committee and the committees on transportation; on maintenance; on automatic

train stops; on relations between railroads; on explosives and on electrical working.

Railway Business Association.

Howard Elliott, chairman of the New York, New Haven & Hartford Railroad, and James M. Cox, governor of Ohio, are announced as the speakers for the fifth annual dinner of the Railway Business Association, which will be held at the Waldorf-Astoria hotel, New York, Thursday evening, December 11. The business meeting of the association occurs at 11 a. m. at the Waldorf, the election of officers at 1:30 p. m., and the dinner at 7 p. m.

American Society of Mechanical Engineers.

A paper on a new centrifugal pump with helical impeller will be presented on Tuesday evening, November 11, by C. V. Kerr, sales engineer of the A. S. Cameron Steam Pump Works, New York. Discussion will follow in which all are invited to take part. An informal dinner (à la carte) will be served at 6:30 p. m. Those desiring to participate should notify H. R. Cobleigh, 505 Pearl stret, New York.

June Mechanical Conventions.

A meeting of the executive committees of the Railway Supply Manufacturers', the Master Car Builders' and the Master Mechanics' Associations will be held at the Vanderbilt Hotel, New York, at 10 a. m., Tuesday, November 4, to formulate plans for the conventions to be held next year.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May, 1914.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass. Convention, May 19, 1914, St. Louis.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill. Next convention, April 21, Houston, Tex.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—H. G. McConnaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, November 19, 1913, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 20-22, 1914, Los Angeles, Cal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 17-20, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wenlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, 1914, St. Paul, Minn.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 20-23, New Orleans, La.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 9-10, Galveston, Tex.

ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Detroit, Mich. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after second Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, May 20-22, Galveston, Tex.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago. Annual convention, May 18-22, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.

MAINTENANCE OF WAY & MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Next convention, November 18-20, Louisville, Ky.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR & LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NATIONAL RAILWAY APPLIANCE ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3rd Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria; 2d Thursday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York. Annual dinner, second week in December, 1913, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MAUNFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Mobile & Ohio, Mobile, Ala.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo. Next meeting, November 11-12, Baltimore, Md.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, Chicago.

UTAH SOCIETY OF ENGINEERS.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3rd Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The next meeting of the Western Classification Committee is to be held at Monterey, Cal., on January 13, 1914.

A meeting of the Official Classification Committee will be held at New York on November 11, and a preliminary meeting will be held at Chicago on November 6, for consideration of recommendations of the Committee on Uniform Classification.

In a hearing before the Public Service Commission at Boston this week, representatives of the express companies said that the introduction of the parcel post had been followed by a reduction of 40 per cent. in the amount of their suburban merchandise traffic out of Boston.

The United Typothetæ of America, at a meeting in New Orleans last week, adopted resolutions urging upon the Interstate Commerce Commission "the necessity of giving thorough consideration at the earliest possible date to the application recently filed by the railroads for permission to increase freight rates."

The Chicago Transportation Association has established an educational bureau. Meetings will be held in the club rooms twice a month, at which traffic subjects will be discussed by various speakers. The first meeting on November 5 will be addressed by G. H. Whittle, assistant general agent of the American Express Company.

The Great Northern and the Minneapolis, St. Paul & Sault Ste. Marie have announced that they will apply the Minnesota state freight rates, upheld by the recent decision of the Supreme Court, to traffic between Duluth and other Minnesota points. These roads have not heretofore done so because their lines to Duluth run partly in Wisconsin.

The Southern Railway announces that beginning November 17 the new steamships *City of Richmond* and *City of Annapolis* will be put in regular service between Baltimore, Md., and West Point, Va., and that a steamboat train with a parlor car will be run in connection, between West Point and Richmond, going through without intermediate stops.

The Southern Railway announces that beginning November 16, a new train is to be run between New York and Atlanta, to be known as the "Atlanta Special." It will run on the present schedule of the New Orleans Limited, which will be changed so as to run later in both directions. Both trains will be high class and will have only Pullman cars. With this addition there will be four high class through trains daily in each direction between New York and Atlanta over the Southern Railway.

The Chicago & North Western has announced that it will, on November 1, discontinue the service of the White Audit System, which furnishes train auditors for checking passenger train collections on a number of roads. The North Western will employ its own men as train auditors. About twelve men will be required, and they will report to the general superintendent. The reasons given for the change are that the conductors are less inclined to resent auditing by fellow employees than by men employed by a private agency, and that the work can be carried on more successfully by the company itself.

The passenger department of the Chicago & North Western has established representatives in 18 of the principal cities of Europe, including London, Liverpool, Glasgow, Southampton, Antwerp, Rotterdam, Paris, Havre, Marseilles, Rome, Genoa, Naples, Berlin, Hamburg, Bremen, Frankfurt, Copenhagen and Christiania. These representatives are experienced men, qualified to plan itineraries, quote rates, check baggage and arrange for payment of customs; and they will supply maps and descriptive matter and assist in arranging all minor details incident to a trip from Europe to and through America.

A committee of the Mercantile Exchange, New York City, will ask the Interstate Commerce Commission to suspend the new rules, covering delivery of eggs, filed by the Erie, the New York Central and the Lackawanna. The chief cause of complaint is that the rules do not allow of examination at point of delivery by the consignee except in instances where the cases show external evidence of damage. The rules do not cover shipments in apparent good order. The committee will demand the same treatment that is accorded to egg merchants in Boston and Philadelphia. It will be recalled that there have been extensive frauds at New York in connection with claims for damage to eggs in transit.

Boston in Danger.

The transportation committee of the Boston Chamber of Commerce, D. O. Ives, chairman, announces that action will be taken in the courts to prevent the enforcement of the recent order of the Interstate Commerce Commission requiring, in substance, that the rates on import freight traffic, westbound, over the railroads from the Atlantic seaboard, must be the same from Boston as from New York. Mr. Ives says:

"Ever since freight rates have been published all rail rates on imports from Boston, westward have always been lower than those from New York, and during a large part of the last two decades the rates have been lower from Boston than from Baltimore and Philadelphia.

"For three years, 1906-07-08, when Boston had a 70 cent rate, Philadelphia 69 cents, Baltimore 67 cents, and New York 75 cents, Boston carried 14.1 per cent. of the traffic, Baltimore 34.4 per cent., Philadelphia 20.4 per cent. and New York 31.1 per cent. From 1909 to June 30, 1911, Boston carried 13.3 per cent., Baltimore 28.7 per cent., Philadelphia 18.8 per cent. and New York 39.2 per cent., showing that even under the reduced rate from Boston, Boston lost rather than gained, and New York, in spite of its comparatively high rates, increased from 31.1 per cent. average for 1906-07-08 to a 39.2 per cent. average for 1909-10-11, Baltimore and Philadelphia also losing. In other words, New York gained at the expense of the other ports, although its rates were made higher proportionately.

"These figures were available to the Interstate Commerce Commission but were apparently given little attention, the decision being based on the technicality that it would be discrimination for a line like the New York Central, serving both New York and Boston, to charge less from Boston than from New York.

"It is not quite clear whether the order is applicable to the Boston roads (it says that a carrier must not make rates from New York which will exceed those which it makes from Boston), for the commission has no authority to order rates advanced. The Boston roads were willing in 1908 to run the risk of a rate war to secure a 67 cent rate, as against the 70 cent rate. Today they are threatened with this 75 cent rate, and it is believed that the enforcement of the advance would close the port of Boston to this traffic. This being the case, it can be readily understood that both the Chamber and the railroad officers feel that the matter requires heroic action."

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association in presenting statistical bulletin No. 153-A, giving a summary of car surpluses and shortages by groups from July 4, 1912, to October 15, 1913, says: The total surplus on October 15, 1913, was 37,198 cars; on October 1, 1913, 41,994 cars, and on October 10, 1912, 22,810 cars. Compared with the preceding period, there is a decrease in the total surplus of 4,796 cars, of which 1,451 is in box, 208 in flat, 1,939 in coal and 1,198 in miscellaneous car surplus. The decrease in box car surplus is in groups 3 (Ohio, Indiana, Michigan and western Pennsylvania); 4 (the Virginias and Carolinas); 6 (Iowa, Illinois, Wisconsin and Minnesota); 7 (Montana, Wyoming, Nebraska and the Dakotas), and 8 (Kansas, Colorado, Oklahoma, Missouri and Arkansas). The decrease in flat car surplus is in groups 2 (New York, New Jersey, Delaware, Maryland and eastern Pennsylvania); 3, 8 (as above), and 9 (Texas, Louisiana and New Mexico). The decrease in coal car surplus is in all groups, except 1 (New England lines); 6 (as above), and 11 (Canadian lines). The decrease in miscellaneous car surplus is in groups 4, 6, 7, 8 (as above), and 10 (Washington, Oregon, Idaho, California, Nevada and Arizona).

The total shortage on October 15, 1913, was 43,246 cars; on October 1, 1913, 31,620 cars, and on October 10, 1912, 54,389 cars. Compared with the preceding period; there is an increase in

the total shortage of 11,626 cars, of which 7,743 is in box, 153 in flat, 2,109 in coal and 1,621 in miscellaneous car shortage. The increase in box car shortage is in all groups, except 1 and 2 (as above). The increase in flat car shortage is in all groups except 6, 9 and 10 (as above). The increase in coal car shortage is in all groups, except 1, 6 and 11 (as above). The increase in miscellaneous car shortage is in groups 3, 6, 7 and 11 (as above).

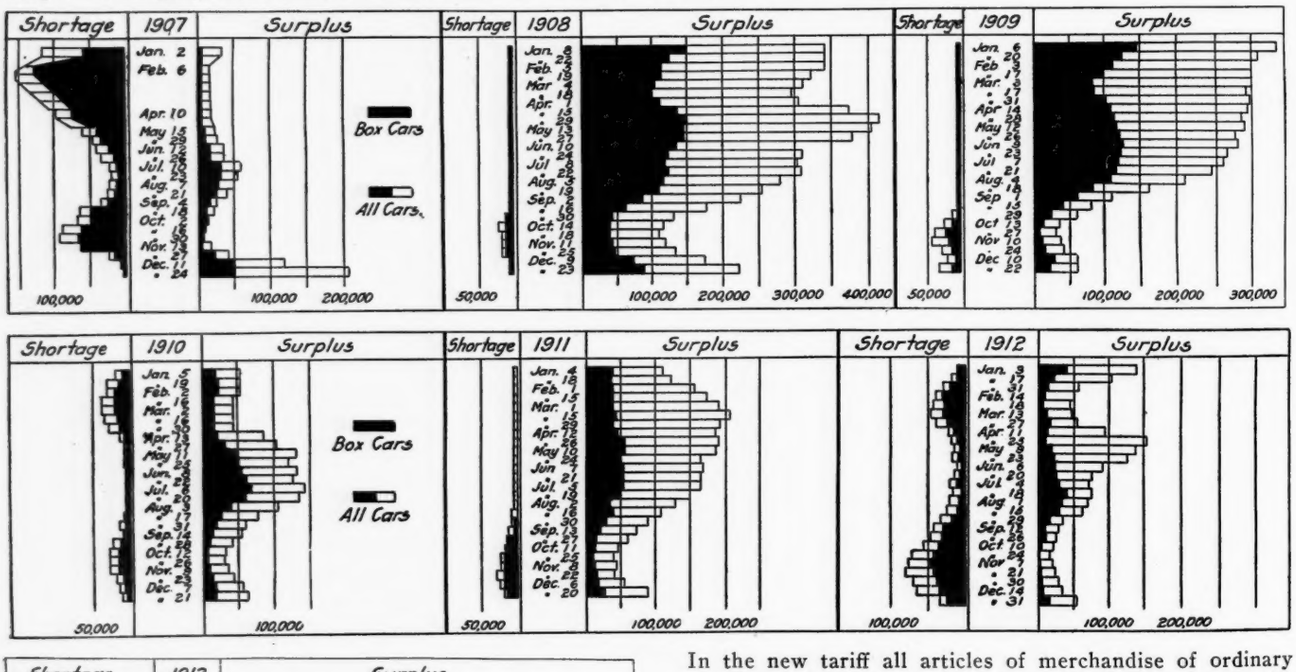
Compared with the corresponding period of 1912; there is an increase in the total surplus of 14,388 cars, of which 9,935 is in box, 1,877 in flat, 3,053 in miscellaneous, and a decrease of 477 in coal car surplus. There is a decrease in the total shortage of 11,143 cars, of which 7,728 is in box, 1,966 in flat, 2,395 in coal, and an increase of 946 in miscellaneous car shortage.

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report and the diagram shows total bi-weekly surpluses and shortage from 1907 to 1913.

Car Surpluses and Shortages.

Date	No. of roads.	Surpluses Box.	Flat.	Coal, goldola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—October 15, 1913	7	0	0	86	131	217	375	151	0	3	529
" 2.— " 15, 1913	30	853	32	719	411	2,015	1,083	2	2,301	26	3,412
" 3.— " 15, 1913	28	306	21	200	1,040	1,567	4,116	206	2,612	1,696	8,630
" 4.— " 15, 1913	13	3,127	692	705	486	5,010	4,062	472	5,028	569	10,131
" 5.— " 15, 1913	23	38	131	125	307	601	1,721	235	1,048	50	3,054
" 6.— " 15, 1913	33	1,480	298	1,072	2,408	5,258	2,657	165	350	379	3,551
" 7.— " 15, 1913	4	34	40	15	166	255	689	9	51	138	887
" 8.— " 15, 1913	18	2,132	279	1,163	1,586	5,160	498	62	227	30	817
" 9.— " 15, 1913	14	3,025	192	424	770	4,411	160	0	27	18	205
" 10.— " 15, 1913	22	2,817	941	1,485	5,747	10,990	1,080	204	166	282	1,732
" 11.— " 15, 1913	6	824	330	20	540	1,714	8,580	604	692	422	10,298
Total	198	14,636	2,956	6,014	13,592	37,198	25,021	2,110	12,502	3,613	43,246

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California, Nevada and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages 1907 to 1913.

Express Rates to Be Reduced.

Walker D. Hines, counsel for the Adams, the American, the Southern, the United States and the Wells-Fargo Express Companies, has notified the Interstate Commerce Commission that these companies have decided to comply with the order of the commission issued recently, requiring radical reductions in rates for the transportation of merchandise. This decision has been reached by the companies notwithstanding the fact that they estimate that their revenues will suffer to the extent of from 15 to 25 per cent. The reductions are to go into effect December 1, or as soon as the companies can prepare the tariffs. Mr. Hines' statement says that the companies hope by this action to win the confidence of the commission and also of the state commissions and the public.

The new rates are to be based on a tabulated statement of 650,000 rates which has been issued by the commission as a basis for express rate charges throughout the United States. This document fills over 1,100 pages, 9 in. x 12 in.

In the new tariff all articles of merchandise of ordinary value are to be carried at first class or ordinary merchandise rates. All articles of food or drink are second class, and are carried at 75 per cent of the ordinary rates. Articles of extraordinary value must be so declared at the time of shipment. There is a classification showing numerous exceptions. The rate basis covers the whole country and the companies are required to make joint rates where necessary. The block system is used, as set forth in the commission's order of June, 1912. The commission's final order was given in the *Railway Age Gazette*, August 8 last, page 233.

All rates are based on the carrier's risk, at a limited valuation, and all rates based on owner's risk are eliminated.

The most important change is the modification of the table of graduated charges for shipments weighing less than 100

lbs. At present there is no uniform basis for computing such rates.

INTERSTATE COMMERCE COMMISSION.

The commission has further suspended from November 15 until May 15 proposed advanced rates on fresh meats from St. Louis, Omaha and other points to points in Oklahoma.

The commission has suspended from November 22 until May 22 tariffs by which it was proposed to increase rates on flour from points in Kansas and other western states to California.

The commission has further suspended from November 20 until May 20 certain increased rates on fruits and vegetables between points in California, Nevada and other western states.

The commission has further suspended from November 8 until May 8 a Chicago & Eastern Illinois tariff by which it was proposed to advance rates on coal from mines in Indiana and Illinois to points in Iowa.

Volco, Fifth Class.

Volco Mfg. Co. v. Atchison, Topeka & Santa Fe. Opinion by Commissioner Meyer:

The complainant's petition for the establishment of low commodity rates on eastbound shipments of its product not granted. The reduction of the present rates to a level suggested by the findings in the *Kansas Rate case* allowed.

The Volco Manufacturing Company, Wichita, Kans., makes a cleansing compound composed chiefly of a so-called volcanic ash, a considerable deposit of which, located at Anthony, Kans., about 57 miles southwest of Wichita, is owned by the complainant. It is desired to extend its field of usefulness. (28 I. C. C., 289.)

Rates to Montezuma Reduced.

City of Montezuma, Ga., v. Central of Georgia et al. Opinion by Chairman Clark:

Upon complaint that freight rates from the Ohio river crossings, the Virginia cities and eastern cities to Montezuma, Ga.. are unreasonable, unjustly discriminatory, and in violation of the long-and-short-haul rule; *Held,* That the rates complained of are unjustly discriminatory against Montezuma and dealers thereat, and unduly preferential to Cordele and Americus, Ga., and dealers thereat. No finding is made as to the long-and-short-haul feature of complaint, as that question is before the commission for the entire southeastern territory in another proceeding and upon a voluminous record. (28 I. C. C., 280.)

Sandstone, Minn.; Building Stone Rates.

Opinion by Chairman Clark:

Respondents published joint commodity rates on building, curbing and paving stone from Sandstone and Banning, Minn., to Kansas City, Omaha and other Missouri river points, and provided in their tariff that upon request therefor they would establish rates no higher from intermediate points. Upon request for the establishment of such rates from an intermediate point, respondents filed cancellation of the rates from Sandstone and Banning; *Held,* That respondents have failed to show that the resulting increased rates would be reasonable; that the existing rates are, and for the future will be, reasonable; and that respondents should establish rates no higher from intermediate points upon proper request therefor. (28 I. C. C., 269.)

Sheridan and Kirby Coal Rates Reduced.

Sheridan Chamber of Commerce v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Meyer:

Rehearing. The original hearing dealt with rates on coal from Sheridan, Wyo., to destination on the Chicago & North Western in Nebraska and South Dakota, on the Chicago, Milwaukee & St. Paul in South Dakota, and on the Northern Pacific east and west of Billings, Mont. Upon the rehearing the Big Horn Collieries Company, Owl Creek Coal Company, and Board of Railroad Commissioners of Montana were granted leave to intervene. The first two ask that the rates from mines near Kirby, Wyo., be adjusted so as to bear a proper relationship to rates established from Sheridan to destinations in the three cases under consideration. *Held:*

Sheridan coal should move to points upon the Chicago & North Western and the Pierre, Rapid City & Northwestern herein involved at the same rate enjoyed by Hudson. Proper routing for coal moving from Sheridan to these destinations is prescribed.

Joint rates should be established from Kirby to destinations on the Chicago & North Western and the Pierre, Rapid City & Northwestern herein involved no higher than one dollar above the rates prescribed from Sheridan.

For distances within 500 miles of the point of origin joint rates should be established from Sheridan to points on the Northern Pacific east of Billings not more than 40 cents over those prevailing from Red Lodge, and to points west of Billings 55 cents over Red Lodge, and from Kirby to points on the Northern Pacific east and west of Billings joint rates should be established not more than 65 cents over the prevailing rates from Red Lodge. To points between 500 and 600 miles from Sheridan the differentials suggested as compared with rates from Red Lodge should be decreased 10 cents, and for each 100 miles additional a further reduction of 10 cents should be made in the differential.

It is possible for a carrier to discriminate unjustly and unlawfully against a point which it does not reach over its own rails.

The difference in cost of production cannot be recognized as a basis for the adjustment of freight rates between different localities. (28 I. C. C., 250.)

STATE COMMISSIONS.

The Railroad Commission of Louisiana has announced a hearing, to be held on November 7, to consider the adoption of an order requiring all railroads in Louisiana to employ and keep in service at least one competent flagman in addition to the brakeman, on all trains operating in the state.

The California Railroad Commission has issued a general order directing all steam and electric railways in the state to provide sanitary individual drinking cups for passengers at a cost not to exceed one cent a cup. These must be provided on all trains whose schedule between terminals exceeds 1 hour and 30 minutes.

Express companies operating in Wisconsin have agreed to accept, in place of the recent order of the state railroad commission, requiring them to reduce their rates on merchandise in Wisconsin 20 per cent., a supplementary order requiring them to reduce their rates on all classes of articles to rates similar to those recently established by the Interstate Commerce Commission.

The Public Utility Commissioners of New Jersey have issued a general memorandum in which they say that the commission will interpret the law which says that no corporation using right-of-way, etc., shall "issue, sell and deliver its bonds, notes or obligations of any character except in return for cash to the extent of at least 80 per centum of the face value of said securities issued or for property of an actual cash value of at least 80 per centum of the face value of the securities issued in payment therefor," as applying to the issue of bonds to be deposited as collateral under notes or other loans. The commission, however, apparently doubts whether or not under the statute railroads would be permitted to issue bonds as collateral for loans under any circumstances.

COURT NEWS.

Leo V. Hahn and T. F. Ryan, doing business as the Imperial Rice Company of Houston, have pleaded guilty in the Federal Court in Texas to an indictment charging them with obtaining unlawful concessions on interstate shipments of rice.

In the Federal Court at New York City, on Tuesday last, Henry A. Dix entered a plea of guilty and was fined $500 for false classification of freight shipped by his firm, Henry A. Dix Sons & Co., makers of women's dresses. The Grand Jury has found indictments for a similar offense against the American Thermo-ware Co. for shipping optical instruments classed as hardware. The United States District Attorney is investigating charges against 150 firms in New York City alleging fraud against the railroads. The most numerous class of offenders consists of dealers in millinery, feathers and artificial flowers.

Railway Officers.

Executive, Financial and Legal Officers.

E. C. Smith, of St. Albans, Vt., and formerly governor of Vermont, has been elected president of the Central Vermont, succeeding E. J. Chamberlin.

J. C. Brinton, secretary to the president of the Erie, has been appointed an assistant secretary of the company, with headquarters at New York.

J. P. Blair, for a number of years general counsel for Southern Pacific interests in Louisiana, has been appointed general counsel of the Southern Pacific Company, with headquarters at New York, succeeding Maxwell Evarts, deceased. Mr. Blair was born at Columbus, Miss., and graduated from the University of Virginia in 1882, with the degree of master of arts. He was for two years professor of mathematics at the University of Louisiana. He studied law during this time, and began the practice of law in 1884. Soon afterwards he became a member of the firm of Leovy & Blair, and has been connected with the Southern Pacific Company during practically the whole of its corporate life and of his professional life.

W. T. Stringer, chief clerk to the president of the Western Maryland at Baltimore, Md., has been appointed to the new position of assistant to the president and C. H. Porter, who has been in the office of the president for the past six months, succeeds Mr. Stringer. In 1898 Mr. Stringer entered the service of the Western Maryland as a stenographer in the office of the general auditor and has been in the continuous service of that road ever since. He was later transferred to the traffic department and then was again transferred to the operating department. In 1905 he was appointed secretary to vice-president and general manager, and subsequently was promoted to chief clerk, and at the time of his recent appointment as assistant to president was chief clerk to the president of the same road.

Thomas Milton Schumacher, vice-president of the El Paso & Southwestern System at New York, has been elected chairman of the board of the Chicago, Rock Island & Pacific Railway and of the Rock Island Company, succeeding D. G. Reid, also chairman of the executive committee of both companies, succeeding W. H. Moore. He was born on February 16, 1862, at Williamsport, Pa., and began railway work in 1879 as a telegraph operator for the Atlantic & Great Western. He then served in various positions on different roads in the operating department as operator, and in the train service until 1883, when he became clerk in the Missouri Pacific local office at St. Louis, Mo. From 1885 to 1887, he served as cashier, chief clerk and contracting agent at St. Louis of the Cleveland, Columbus, Cincinnati & Indianapolis. In 1887, he became chief clerk in the office of the general agent of the Union Pacific at Omaha, Neb., and three years later was made general agent of that road at San Francisco, Cal., which position he held four years. He was subsequently for two years vice-president and general manager of the Continental Fruit Express, with headquarters at Chicago, with the exception of about six months from November 1, 1901, when he resumed his former position. Mr. Schumacher was then until September, 1905, traffic manager of the Oregon Short Line, and subsequently for a short time was traffic manager of the United Fruit Company at New York. In 1906 he was made general traffic manager of the railroads and industrial companies controlled by Phelps, Dodge & Company of New York, with headquarters at Chicago, where he remained until December 1, 1909 when he resigned to accept the vice-presidency of the Denver & Rio Grande and Western Pacific, with office at San Francisco. Mr. Schumacher was appointed assistant director of traffic of the Union Pacific and Southern Pacific systems on May 1, 1910, with headquarters at Chicago, and on December 1, of that year, became traffic manager of the American Smelting & Refining Company and its allied companies with offices at New York. On November 1, 1912, he became vice-president of the El Paso & Southwestern system, also vice-president of the Nevada Northern and the Bingham & Garfield.

T. M. Schumacher.

Operating Officers.

E. E. McClellan has been appointed general superintendent of the San Benito & Rio Grande Valley, with headquarters at San Benito, Tex., succeeding E. S. Heyser, resigned.

The title of F. A. Redmond, acting manager fuel oil properties of the Gulf, Colorado & Santa Fe, is changed to manager fuel oil properties, with headquarters at Galveston, Tex.

G. N. Howson, master mechanic of the Southern Railway at Princeton, Ind., has been appointed superintendent of the St. Louis and Louisville divisions, with headquarters at Louisville, Ky., succeeding F. W. Brown, resigned.

The office of J. Cannon, superintendent of the Eastern division of the Missouri Pacific, has been transferred from Sedalia, Mo., to Jefferson City, Mo. D. H. Robinson, trainmaster of the St. Louis district at Sedalia, has been appointed assistant superintendent at that place.

Traffic Officers.

F. D. Daggett has been appointed assistant general passenger agent of the San Antonio & Aransas Pass at San Antonio, Tex.

M. J. Hannam, commercial agent of the St. Paul & Kansas City Short Line at Minneapolis, Minn., has been appointed general freight and passenger agent of the San Antonio, Uvalde & Gulf, with headquarters at San Antonio, Tex.

T. F. Ellzey, commercial agent of the Missouri & North Arkansas at New Orleans, La., has been appointed traveling freight agent of the Missouri Pacific, Denver & Rio Grande and Western Pacific, with headquarters at New Orleans.

Roy B. Campbell has been appointed city ticket and passenger agent of the Minneapolis & St. Louis at Des Moines, Iowa, to succeed C. M. Brown, who was transferred to Minneapolis, Minn., as rate clerk in the general passenger department.

R. G. Smock, district freight agent of the St. Paul & Kansas City Short Line at Des Moines, Ia., has been appointed commercial agent of the Chicago, Rock Island & Pacific at that point. O. B. McNamee, contracting freight agent of the former road, has been appointed traveling freight agent of the Rock Island, with headquarters at Des Moines.

J. D. Watson having resigned as assistant general freight agent of the St. Louis Southwestern to become vice-chairman of the executive committee of the Southwestern Traffic Committee, the duties heretofore performed by him have been assigned to J. E. Allen, assistant general freight agent at St. Louis, Mo. W. S. Cornell is appointed assistant general freight agent at St. Louis. Effective November 1.

F. A. Leland, chairman of the Executive Committee of the Southwestern Tariff Committee, having been assigned certain duties concerning the preparation for the defense of carriers in complaints pending before the Interstate Commerce Commission, involving rate adjustments in the committee tariffs, J. D. Watson is appointed vice-chairman, and will be connected with the work referred to. Headquarters St. Louis, Mo.

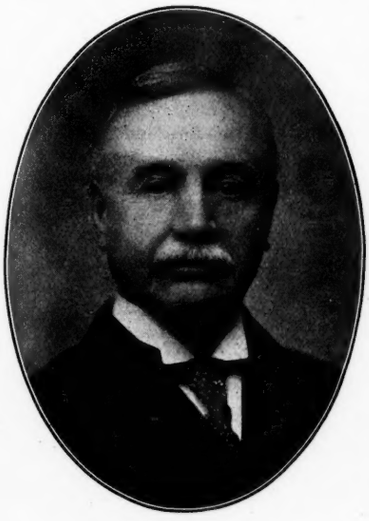
Engineering and Rolling Stock Officers.

Isaac Maxwell Taylor, general roadmaster of the Northern Pacific at Glendive, Mont., has been transferred to Forsyth, Mont., as roadmaster, in place of Gustav Gullickson, who has been granted six months' leave of absence.

G. M. Stone has been appointed master mechanic of the Oklahoma division of the Rock Island Lines, with headquarters

at Chickasha, Okla., succeeding W. J. O'Neill, who has been appointed master mechanic of the Pan Handle and the Indian Territory divisions, with office at Shawnee, Okla., in place of C. A. McCarthy, resigned to accept service with another company.

Charles W. Johnson, who November 1 becomes consulting engineer of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn., as mentioned elsewhere, was born January 20, 1845, at Johnstown, N. Y. He was graduated from Union College at Schenectady, N. Y., in the class of 1866, and began railway work January 3, 1867, in the assistant chief engineer's office of the Michigan Southern & Northern Indiana. From May, 1870, to January, 1871, he was assistant engineer of construction of the Chicago & Southwestern, and from February, 1871, to November, 1878, he was successively assistant engineer and division engineer of the Wisconsin Central. Mr. Johnson went to the Chicago, St. Paul & Minneapolis, March 1, 1879, as chief engineer, which position he has held continuously for over 34 years with that road and its successor, the Chicago, St. Paul, Minneapolis & Omaha. He is now made consulting engineer, with office at St. Paul, as mentioned above, after a railway service of 47 years.



C. W. Johnson.

H. Rettinghouse, who has been appointed chief engineer of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn., as stated elsewhere, was born in Germany on July 30, 1861. He was educated in Germany, and came to the United States in 1882, beginning railway work in 1883 as rodman on construction work on the St. Paul extension of the Wisconsin Central. The following year he became connected with the Milwaukee, Lake Shore & Western, now a part of the Chicago & North Western, and was successively leveler, instrument man and assistant engineer in charge of location, construction and maintenance. Mr. Rettinghouse was engaged in a general engineering business at Ashland, Wis., from 1893 to 1897, including three years' service as city engineer of that city. He then returned to the North Western, and was assistant engineer in charge of construction and maintenance until May, 1900, and from the latter date to February, 1905, was superintendent of bridges and buildings of the Ashland division. He was then division engineer of the Southern division of the Wisconsin Central, resigning in January, 1907, to become division engineer of the Chicago & North Western at Boone, Iowa, in charge of maintenance of East Iowa, West Iowa and Iowa & Minnesota divisions. In April, 1912, he was made superintendent of the Iowa & Minnesota division at Mason City, Iowa, from which position he is now promoted to chief engineer of the Chicago, St. Paul, Minneapolis & Omaha, a subsidiary line of the North Western.

H. Rettinghouse.

C. W. Johnson, chief engineer of the Chicago, St. Paul, Minneapolis & Omaha, has been appointed consulting engineer, with headquarters at St. Paul, Minn. H. Rettinghouse, superintendent of the Iowa & Dakota division of the Chicago & North Western at Mason City, Iowa, succeeds Mr. Johnson as chief engineer of the former road, with office at St. Paul. Effective November 1.

Robert Quayle, whose appointment as general superintendent of the motive power and car departments of the Chicago & North Western is announced elsewhere, was born at Douglas, Isle of Man. He began railway work with the Chicago & North Western in 1871 as machinist apprentice and until June, 1885, was successively journeyman machinist, gang boss and foreman. He was then promoted to the position of master mechanic and nine years later, on December 1, 1894, was made superintendent of motive power and machinery. After serving in the latter capacity for 19 years he will on November 1 become general superintendent of the motive power and car departments, with headquarters at Chicago, as above noted. Mr. Quayle was president of the Railway Master Mechanics' Association 1898-1899.

Robert Quayle.

H. T. Bentley, assistant superintendent of motive power and machinery of the North Western, who will succeed Mr. Quayle as superintendent of motive power and machinery, as mentioned elsewhere, was born June 4, 1862. He was educated at Dulwich College, and began railway work in 1877 with the London & North Western of England, where he was employed as an apprentice machinist until 1887. He was then for five years foreman of enginehouse of the same road at Chester, England. In 1892 he began to work for the Chicago & North Western as machinist at the Chicago shops. Later he was made foreman of shops at Boone, Iowa, and from 1895 to 1898 was foreman at Belle Plaine, Iowa. He was then general foreman at Clinton, Iowa, and subsequently from April 1 to December 30, 1899, was master mechanic of the Madison division. Mr. Bentley was transferred to the Iowa division as master mechanic on January 1, 1900, where he remained until August 31, 1902, when he was appointed assistant superintendent of motive power and machinery at Chicago, and, as stated above, on November 1 he will be promoted to superintendent of motive power and machinery. Mr. Bentley was president of the Western Railway Club 1906-1907; president of the American Railway Master Mechanics' Association

H. T. Bentley.

1911-1912, and president of the International Railway Fuel Association 1912-1913. He is chairman of the sub-committee of mechanical officials of the General Managers' Association of Chicago for the prevention of smoke in the city of Chicago, and also is a member of the Headlight Committee of the Master Mechanics' Association. Mr. Bentley also is a member of the American Society of Mechanical Engineers.

Robert Quayle, superintendent of motive power and machinery of the Chicago & North Western, has been appointed general superintendent of the motive power and car departments, and H. T. Bentley, heretofore assistant superintendent of motive power and machinery, succeeds Mr. Quayle, both with headquarters at Chicago. C. A. Schroyer, superintendent of the car department, and Mr. Bentley will report to Mr. Quayle. Effective November 1.

E. M. Sweetman, master mechanic of the Southern Railway at Birmingham, Ala., has been appointed master mechanic, with headquarters at Princeton, Ind., succeeding G. N. Howson, appointed superintendent. Frank Johnson, master mechanic at Sheffield, Ala., succeeds Mr. Sweetman; J. W. Gibbs, master mechanic of the Virginia & Southwestern at Bristol, Tenn., succeeds Mr. Johnson, and E. L. Akans has been appointed master mechanic of the Virginia & Southwestern, with office at Bristol, Va.Tenn., succeeding Mr. Gibbs.

B. B. Milner, assistant master mechanic of the Philadelphia, Baltimore & Washington at Wilmington, Del., has been appointed special engineer on the staff of the senior vice-president of the New York Central lines, with headquarters at New York. He began railway work as a machinist's helper in the Parsons, Kans., shops of the Missouri, Kansas & Texas, resigning in 1900, to enter the mechanical engineering school of Purdue University from which he graduated in 1904. He then entered the service of the Pennsylvania Railroad as special apprentice at the Altoona shops. From September, 1904, to 1905 he was engaged in work under E. D. Newson, engineer of tests and chairman of the committee appointed by the Association of Transportation Officers to investigate the "Low Mileage of Freight Car Equipment," and then was special representative of the superintendent of motive power, returning to regular machine and erecting shop work for a time. In the fall of 1905 he was again assigned by the engineer of tests to special work investigating and preparing a report on relations existing between speed and load in freight train performance, and the following year was engaged in planning a rearrangement in the location of machine tool equipment at the Altoona shops. During the first half of 1908, he was sent to the West to visit the principal railroad shops for the collection of ideas on betterment methods and practices, and for a short time was engaged in putting these into effect. He was then engaged in special work under the direction of the assistant to general manager of the Pennsylvania Railroad at Philadelphia, including a study of betterment problems, and in May, 1911, was appointed assistant master mechanic at Wilmington, Del., but was temporarily relieved of his duties in 1912 to handle the preparation under the general manager at Philadelphia of the Pennsylvania's case for presentation to board arbitrating in 1912 the enginemen's demands for increases in wages and adjustments of working conditions. He was engaged in similar work in the firemen's arbitration in 1913, under the direction of the chairman of the Conference Committee of Managers, and since January, 1913, when he was relieved of those duties he has been engaged as assistant master mechanic at Wilmington.

Purchasing Officers.

D. C. Curtis, for the past three years inspector of stores of the Chicago, Burlington & Quincy, with headquarters at Chicago, has been appointed scrap expert for the Panama Canal Commission, with headquarters at Colon, Panama. The duties of Mr. Curtis have to do with the disposing of the machinery and other second hand and scrap material left from the construction of the Panama canal.

OBITUARY.

E. S. Prindiville, traveling passenger agent of the Chicago, Burlington & Quincy, at Pittsburgh, Pa., died on October 20, in that city, at the age of 31. He was born in Chicago, and began railway work in October, 1902, as a clerk on the Burlington, and had been in the continuous service of that road ever since. In 1903 he was made cashier, and later became passenger agent. Since 1906 he had been traveling passenger agent of the same road, at Pittsburgh.

George F. Lee, general baggage agent of the Chicago, Rock Island & Pacific, died suddenly at his home in Chicago on October 24, aged 53 years. Mr. Lee began railway work in 1877 as ticket, freight and general agent of the Baltimore & Ohio. He was northwestern passenger agent of the Chicago, Rock Island & Pacific from 1881 to 1884, then returning to the Baltimore & Ohio for four years as general agent. He again became connected with the Rock Island in 1888, and was successively general agent of the passenger department, ticket agent and city passenger agent, with headquarters at Chicago, general agent of the passenger department, and since 1905, general baggage agent.

Frank E. Brown, first assistant general passenger agent of the Boston & Maine, at Boston, Mass., died at his home in Concord, N. H., on October 27. He was born in 1850, at Claremont, N. H., and entered railway work in August, 1868. He was clerk and bookkeeper in the cashier's office, until 1880, and was subsequently superintendent's clerk and then was general ticket agent of the Concord Railroad. From January, 1890, to July, 1895, he was general passenger and ticket agent of the Concord & Montreal, and in July, 1895, was appointed assistant general passenger and ticket agent of the Boston & Maine (which absorbed the C. & M.), with headquarters at Concord. Since October, 1910, he had been first assistant general passenger agent, and also was general passenger agent of the Mount Washington Railway.

William Osbourne Sprigg, formerly superintendent of the New York division of the Lehigh Valley, died on October 26, at his home in Tompkinsville, Staten Island, N. Y. He was born in 1865, at Cumberland, Maryland, and began railway work in March, 1879, as a rodman and levelman on the George's Creek & Cumberland. He was subsequently assistant engineer of the Baltimore & Cumberland Valley, now a part of the Western Maryland; assistant engineer of the Pittsburg & Western and then to December, 1882, was engineer of construction. In December, 1882, he was appointed master of road on the Baltimore & Ohio, and three years later became engineer of maintenance of way of the New York extension of the same road. From September, 1886, to November, 1894, he was master of transportation of the Staten Island Rapid Transit Railroad, and then was superintendent of the same road. In May, 1897, he was appointed division superintendent of the Southern Railway, and from September, 1898, to August, 1904, was superintendent of the New York division of the Lehigh Valley. He then left railway work to organize the General Contracting & Engineering Company, of which he was president at the time of his death.

Benjamin W. Carskaddon, real estate agent of the Pennsylvania Railroad, with office at Philadelphia, Pa., died on October 23, at Atlantic City, N. J. He was born in February, 1858, at Philadelphia, and received a public school education in that city. He studied conveyancing and attended the real estate law course at the University of Pennsylvania. In February, 1879, he entered the service of the Pennsylvania Railroad in the office of the general solicitor as a conveyancer; but he resigned three years later to go into the real estate business in Pittsburgh. He returned to the service of the railroad company in March, 1885, as agent at Pittsburgh for the real estate department, and had been in the service ever since. From January, 1893, to January, 1900, he was in the office of the real estate agent at Philadelphia, in charge of the branch of that department relating to the taxation of real estate; and then was assistant real estate agent until his appointment, in May, 1902, as real estate agent in charge of the department. In his capacity as real estate agent Mr. Carskaddon has for many years had supervision of the road's real estate transactions, which are numerous and important. One of these was the purchase of the land for the Pennsylvania station and its approaches in and around New York City, involving many millions of dollars and several years' time.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Pennsylvania Southern has ordered 1 consolidation locomotive from the Baldwin Locomotive Works.

The Mobile & Ohio has ordered 7 mikado locomotives, and 7 consolidation locomotives from the Baldwin Locomotive Works.

The Vredenburgh Saw Mills, Vredenburgh, Ala., has ordered 1 ten-wheel locomotive from the Baldwin Locomotive Works.

The Oconto Company, Oconto, Wis., has ordered 1 six-coupled double ender locomotive from the Baldwin Locomotive Works.

The Moore Timber Company, Panama City, Fla., has ordered 1 six-coupled double ender locomotive from the Baldwin Locomotive Works.

The Grayling Lumber Company, Charleston, W. Va., has ordered 1 six-coupled double ender locomotive from the Baldwin Locomotive Works.

The Lehigh & New England Railroad, and the Lehigh Coal & Navigation Company are in the market for 5 consolidation locomotives and 3 switching locomotives.

The Chicago & North Western has ordered 12 Pacific type passenger locomotives, and 18 six-wheel switching locomotives from the American Locomotive Company. The passenger locomotive will have 25 in. x 28 in. cylinders; 75-in. driving wheels; a steam pressure of 170 lbs., and a total weight in working order of 260,000 lbs. The switching locomotives will have 18 in. x 24 in. cylinders; 51-in. driving wheels, a steam pressure of 180 lbs., and a total weight in working order of 141,000 lbs. All these locomotives will be equipped with superheaters.

CAR BUILDING.

The Maine Central is in the market for 10 caboose cars.

The Bangor & Aroostook is in the market for 68 flat cars.

The Chicago & Illinois Midland has ordered 250 coal cars from the Haskell & Barker Car Company.

The Chicago, Burlington & Quincy has ordered 100 tank cars from the American Car & Foundry Company.

The Cumberland Valley has ordered 13 all-steel, 70-ft. passenger coaches, and 3 all-steel 70-ft. combination passenger and baggage cars from the American Car & Foundry Company.

The Minneapolis, St. Paul & Sault Ste. Marie is said to have ordered 500 box cars and 500 coal cars from the American Car & Foundry Company. This item has not been confirmed.

The Lehigh & New England, reported in the *Railway Age Gazette* of October 24, as making inquiries for 250 fifty-ton hopper cars, is now inquiring for 500 hopper cars and 200 gondola cars.

The Mobile & Ohio has ordered 522 fifty-ton steel double drop bottom gondola cars from the Pressed Steel Car Company, and 20 steel underframe 8-wheel caboose cars from the Lenoir Car Works.

IRON AND STEEL.

The New York Central Lines have ordered 5,000 tons of titanium open-hearth rails.

SIGNALING.

The Philadelphia & Reading is to install a new mechanical interlocking plant at Yardley, Pa., on its New York division, to have 36 levers. The contract for manufacture and installation has been given to the Federal Signal Company, Albany, N. Y. The track circuits in connection with this interlocking will have alternating current, the first a. c. track circuits, we believe, to be used in signaling on the Reading.

The New York Central has awarded the order for telephone selector equipment for the West Shore Line, Albany to South Utica, to the General Railway Signal Company, Rochester, N. Y. This circuit comprises 42 selector stations and is 118 miles in length, the despatcher's office being located at Albany. The order specifies G. R. S. power equipment, including an A. C.-D. C. motor generator set and a power switch board with accessories. The motor generator will be operated from a 25-cycle, 110 volts commercial circuit, which is available at the despatcher's station.

The Chicago & Western Indiana has awarded the Union Switch & Signal Company a contract for the installation of electro-pneumatic push-button plants at the eastbound and westbound Chicago clearing yards. The layouts of the two yards are identical, each containing 65 single switches, and each push-button cabinet will have 60 working buttons for the switches and four working buttons for controlling the two one-arm electro-pneumatic three-position signals at each plant provided for governing movements to the yards over the two approaching tracks. Available alternatitng current at 60 cycles, 2,300 volts will be stepped down to 220 volts and fed through the plants for feeding the track circuits. A total of 61 track circuits is to be provided for at each of the yards, with two track circuits being fed from each track circuit transformer.

The Uganda Railway, East Africa.—The Uganda Railway, with a length of about 584 miles, is owned by the state. The line runs from Mombasa to Port Florence on Victoria Nyanza, on which lake there is a connecting steamer service. There is also a branch line under construction from Nairobi to the Thiba river, about 31 miles in length.

Electrification of Swiss Railways.—The question of the electrification of the Swiss government railways is being seriously considered. The question of electrification of all Swiss railways is one of vital importance to the federal government because of the fact that Switzerland is dependent on the surrounding countries for its supply of fuel, no coal being producted in the country, whereas it is rich in natural water power resources. Swiss federal engineers are watching with much interest the experiment of operating the Loetschberg line by electricity, and there is little doubt that the Gothard will be equipped with electric motive power as soon as the success of the Loetschberg experiment is demonstrated. A special staff of engineers has been engaged for some time in the preparation of plans for the change on the Gothard, and a favorable report has been made by the government commission appointed to investigate and report on the feasibility of electrification.

Yunnan Railway, China.—While the breaking out of new disorders in South China prevented immediate activity in the enterprise, except a continuation of survey work already in hand, there is every indication that the construction of the railway from the West River country at or near Nanning, Kwangsi province, China, to Yunnan-fu and thence into West China will be commenced just as soon as the state of the country justifies action. The construction of this line offers special inducements to American capital, as political interests of other nations likely to serve in this connection prevent action on the part of either or any of them—a state of checkmate or a balancing of interests into which American interests can or will have no part and in which therefore American capital can act with freedom and with less opposition than might be expected under other conditions. The line was at first projected from Yunnan-fu to Nanning, there to connect with water transportation by the West River with Wuchow and Canton and Hongkong. For the time being the line is to be constructed to Poseh, a point on the river a considerable distance above Nanning, which is the head of navigation for small boats, and to and from which freight can be handled by boats at present with some degree of freedom, though with more or less difficulty owing to the varying stages of water in the rivers, bad rapids and falls, and various other impediments. Some of these impediments can be removed with comparatively little expense and it is a part of the present plan to improve the means of navigation on the rivers in connection with construction of the railway.

Supply Trade News.

J. R. Wiley, manager of the Standard Underground Cable Company, Pittsburgh, Pa., died on August 17.

The Kelly Reamer Company, Cleveland, Ohio, has increased its common stock from $25,000 to $50,000 to add facilities for its business.

The Southwestern Steel Development Company of Houston, Tex., has announced its intention of establishing a large steel plant, rolling mills and coking plant at Texas City, Tex., involving an expenditure of about $10,000,000.

The Chicago-Cleveland Car Roofing Company has let building contracts for an addition to its Cleveland works and the work is now under way. The entire Cleveland plant is now operated by individual electric motors recently installed. Besides the Cleveland plant, this company is now manufacturing at three different points in Canada.

The officers of the American Locomotive Company have been re-elected. This action followed the annual stockholders' meeting of the company, which was held on October 21, and at which the board of directors was re-elected. Isaac M. Cate, a stockholder at Baltimore, had made certain charges earlier in the year which had been referred to a committee of the board of directors for investigation. President Marshall made an address in which he replied to Mr. Cate's criticisms. A heated discussion followed, in which among other things several of the shareholders demanded that the report of the special investigating committee be made public when it was completed.

The Transue & Williams Company, Alliance, Ohio, has purchased all of the assets of the Davies-Bach Manufacturing Company, including the plant recently erected in Alliance for making steel stampings. It is expected to operate this plant, which is to be known as the steel stamping department of the Transue & Williams Company, and also to enlarge it materially in order to conduct a general steel stamping business. The company also expects to add from 60 to 80 per cent. to the capacity of its present drop forge plant, and is now contracting for new buildings and additional machinery. When the new equipment is in place, about two hundred additional men will be employed.

TRADE PUBLICATIONS.

Watters Grab Bucket.—A 15 page booklet just issued by the Whiting Foundry Equipment Company, Harvey, Ill., describes and illustrates the Watters quick-detachable grab bucket for foundry use. This catalog is No. 104, and will be sent free on request.

Coaling Station.—The Roberts & Schaefer Company, Chicago, Ill., have just issued a four page pamphlet describing their Holman coaling station. The general features of design and the claims for this station are described, accompanied by photographs and drawings of a number of typical recent installations.

Milling Machines.—The Cincinnati Milling Machine Company, Cincinnati, Ohio, has issued a 128-page illustrated catalogue of its milling machines, plain, universal and vertical; high-power with constant speed drive; cone-driven; also its milling machine attachments, semi-automatic manufacturing millers and universal cutter and reamer grinders.

Gyratory Crushers.—The Austin Manufacturing Company, Chicago, has issued catalog 27, devoted especially to the Austin gyratory crusher, which is built in eight sizes ranging in capacity from 5 to 600 tons per hour. The catalog includes complete detailed descriptions and illustrations of the various parts, and descriptions of some of the work on which it has been employed.

Ground Wire Clamp.—W. E. Belcher, Bloomfield, N. J., has issued a pamphlet relating to the Belcher ground wire clamp. The pamphlet discusses briefly the subject of transmission line protection and describes in detail a new device for the attachment and support of the continuous ground wire, now generally used on high voltage lines. Cuts are shown of two styles, one for pole lines and one for steel tower lines.

Railway Construction.

Arkansas Interurban.—This company has issued stock, it is said, to secure funds for building from Little Rock, Ark., southwest to Hot Springs, about 55 miles. W. H. Garanfio, president, and L. Garrett, secretary and manager, Little Rock.

Chicago, Burlington & Quincy.—The new Thermopolis-Casper line has been opened for business from Thermopolis, Wyo., via Bonneville, and Arminto, to Powder River, 94 miles east of Thermopolis. (October 3, p. 637.)

Greene County.—This company, which operates a line from Apalachee, Ga., to Good Hope, 13 miles, has given a contract to S. N. Hughes, Bostwick, Ga., it is said, to build an extension from Good Hope, northwest to Monroe, 6.8 miles.

Lake Erie & Youngstown.—An officer writes that the general contract has been given to C. E. Coon, Youngstown, Ohio, to build a double track line from Youngstown, Ohio, via Andover to Conneaut, 66 miles, and 10 miles of sidings, also 6 miles of spur lines. The line will have 1 per cent. grade, and the work involves handling about 30,000 cu. yds. to the mile. The improvements include construction of harbor facilities at Conneaut on Lake Erie. The company expects to develop a traffic in iron ore, coal, coke and farm products. J. H. Ruhlman, president, Youngstown, Ohio. (September 5, p. 436.)

New York Subways.—The New York Public Service Commission, First district, has about completed the plans for the elevated line through New Utrecht avenue, in the borough of Brooklyn, and will ask for bids for its construction at once. It also has the plans for the Gravesend avenue, or Culver line, well under way, and will advertise for bids for its construction within a short time. Plans are approaching completion for the two new tunnels under the East river—one for operation by the Interborough Rapid Transit Company, and the other by the New York Municipal Railway Corporation, and these should be ready to advertise for bids before the end of the year. Plans for the Eastern parkway subway in the borough of Brooklyn and its connections are also well advanced. The first sections of the line, from the end of the existing subway, out Flatbush avenue to Eastern Parkway, will be submitted to bidders within a short time. In the borough of the Bronx three separate lines for the new subway system will soon be under construction, as follows: The Pelham Bay Park branch, the Jerome avenue branch and the White Plains road branch. The plans for these branches are nearly completed, and a large portion of the work will be under contract in November. The commission has consented to the assignment from the John F. Stevens Construction Company to the Richard Carvel Company of the contract for section No. 1 of routes Nos. 19 and 22, the Southern boulevard and Westchester avenue branch of the Lexington avenue subway. This work calls for building a three-track subway from Alexander avenue through 138th street, and Southern boulevard to about 147th street.

Oklahoma, New Mexico & Pacific.—According to press reports, this company, which is building a line from Ardmore, Okla., west to Waurika, has opened for operation the section between Ardmore and Lone Grove. John Ringling is back of the project. (August 15, page 313.)

Oneida & Western.—Contracts are to be let soon, it is said, to build a section of 10 miles from Oneida, Tenn., west. The company plans to build in all about 25 miles. R. J. Moscorp, chief engineer, Oneida.

Rockcastle River.—Under this name a line is to be built from East Bernstadt, Ky., it is said, north to McKee, about 25 miles. C. C. Williams, Mt. Vernon, may be addressed.

San Antonio, Uvalde & Gulf.—An officer writes that work has been finished on the section from Pleasanton, Tex., to Mathis, and work is now under way by Ward & Lee, Mathis, from Mathis to Corpus Christi, 40 miles. The work involves handling about 30,000 cu. yds. to the mile. There will be a number of steel bridges on the line, including a draw span over Nueces river, which is now being built by the company's forces. A. R. Pondor, president and general manager, Pleasanton, and E. R. Breaker, chief engineer, San Antonio. (August 8, p. 253.)

Southwestern Traction.—This company, which operates a line from Belton, Tex., northeast to Temple, has amended its charter in Texas, increasing the capital stock from $165,000 to $3,500,000, and authorizing extensions as follows. From Temple north to Waco, and from Temple or Belton, south to Austin, in all about 100 miles. Surveys have been made for the extensions, and most of the right of way has been secured. It is expected that construction work will be started soon. In addition the company contemplates extending the line from Austin south to San Antonio. A. F. Bentley, is president, and W. G. Bentley, secretary, both of Temple. (July 25, p. 170.)

Uwharie & Pee Dee Valley.—We are told that application has been made for incorporation in North Carolina to build from Winston-Salem in Forsyth county, N. C., southeast through Guilford, Randolph, Montgomery, Richmond, Scotland, Robeson and Columbus counties, to a point in Brunswick county, probably at Southport, about 200 miles. The incorporators include E. A. Lackey, J. L. Hayward, Thomas Baldwin and O. C. Armstrong. C. A. Armstrong, Troy, is also an incorporator.

Winnemucca Northern.—An officer writes that location survey has been completed to Homedale, Idaho, on Snake river, 240 miles from Winnemucca, which is 40 miles from Boise, Idaho. The plans call for building from Winnemucca, Nev., northeast via Paradise, Quinn river, and McDermott, to Jordan Valley, Oregon, thence to Boise, Idaho, in all 280 miles. The maximum grades will be 1 per cent., and maximum curvature 10 deg. About 75 miles of the work will be heavy. The estimated cost of construction is $7,500,000. The company will probably be ready to start construction work in November. Thomas Nelson, president, San Francisco, Cal.; H. H. Sheldon, chief engineer, Winnemucca, Nev. (February 14, p. 314.)

RAILWAY STRUCTURES.

Denver, Colo.—Architects are engaged on the working plans for the remodeling of the Denver union station, which will practically create a new station. Approximately $2,000,000 is to be expended on the work by the Union Depot Terminal Company.

New Castle, Pa.—The Pittsburgh & Lake Erie is building a two-story brick freight house in New Castle, to cost $25,000. Work on the foundations has been completed.

Pearl, Ill.—The Chicago & Alton has completed the installation of the final span of its new bridge across the Illinois river at this point. The contract was let to the Wisconsin Bridge Company.

Proposed Tunnel Under the English Channel.—The agitation in favor of the tunnel under the English Channel would seem to be based upon arguments which are often out of proportion to the interests involved and almost always short-sighted. To answer the military objections by pointing to England's friendliness with France is entirely to forget how short-lived have been the groupings of European Powers during the nineteenth century. In 1848 England's attitude to France was very doubtful; in 1851, the Exhibition year, relations were good; in 1854 the French and English fought side by side in the Crimea, and in the 'sixties the whole country was enthusiastic about raising volunteers to prevent French attack. In 1870, after the Franco-Prussian War, the relations improved, to be again upset about the time of Fashoda, when England was within an ace of war. Hence the arguments based upon French friendship are of little value. Again, arguments based upon the increased communication which England should have with France are not strong. The tunnel would be almost entirely occupied by passenger trains and a little high-class parcels traffic, and the additional number of people who would travel to France would certainly not be so great as to modify seriously the British attitude towards the Continent, even if such a modification was entirely desirable. To the argument that it would be difficult to defend, less importance attaches than formerly, though history gives innumerable instances of the unforeseen in war time and the failure of carefully pre-arranged plans at the last moment. Apart from this, the old arguments against the tunnel would appear to be as strong as ever, while no new ones have been brought forward in favor of it which are at all convincing.

Railway Financial News.

Bangor & Aroostook.—James Brown, of Brown Brothers & Co., New York, has been elected chairman of the executive committee of the Bangor & Aroostook.

Chicago, Rock Island & Pacific.—On October 27 the New York *Evening Post* published a statement to the effect that Phelps, Dodge & Co., New York, who own the El Paso & Southwestern and who acquired in 1910 a minority interest in the common stock of the Rock Island Company, which is the holding company for the Chicago, Rock Island & Pacific, have now bought a controlling interest in the preferred stock of the Rock Island. Control of the Rock Island preferred carries with it control of the entire voting machinery of the Rock Island system. Phelps, Dodge & Company denied that they had obtained absolute control of the Rock Island; but on the other hand it is not denied that they have made large further purchases of Rock Island securities since 1910, and the *Post* on Tuesday reiterated the fact that today the control of the Rock Island system is in the hands of Phelps, Dodge & Company, and that E. G. Reid is the member of the Moore-Reid syndicate who has sold his holdings.

T. M. Schumacher was on Wednesday elected chairman of the executive committee of the Rock Island Company. For sketch of Mr. Schumacher's life see our Railway Officers' column for this issue.

Hocking Valley.—The Public Utilities Commission of Ohio has authorized the Hocking Valley to issue $4,000,000 one-year 5 per cent. notes of November 1, 1913, to refund an equal amount of notes maturing November 1, 1913. The notes are to be sold at not less than 99.

Pennsylvania Railroad.—The following notice has been officially given out at the president's office:

The finance committee and board of directors are considering the creation of a general mortgage as a basis for the company's financing for many years to come. Under this mortgage it is contemplated to issue bonds in such amounts from time to time as may be required to provide necessary additions, betterments and improvements to its railroads, equipment, property and facilities; the funds that may be necessary to meet maturing obligations, and for such other corporate purposes as may now or hereafter be duly authorized by law. The aggregate amount of bonds that may be issued shall not at any time exceed the outstanding capital stock. When approved by the directors, the whole question will be laid before the stockholders for their consideration at the annual meeting in March next. The company has no expenditures that require immediate financing, but desires to announce the contemplated preparations for the necessary refunding and capital expenditures in 1914, 1915, and later years, which it will be able to meet through the issue of either capital stock, consolidated (first) mortgage bonds, the new general mortgage bonds, or such other form of financing as will produce the best results for the company and meet the monetary conditions prevailing at the time of issue.

St. Louis & San Francisco.—In addition to authorizing the receivers to issue $10,000,000 receivers' certificates, as mentioned in this column last week, Judge Sanborn has authorized the receivers to pay the semi-annual interest, due November 1, on the $69,000,000 general lien 5 per cent. bonds, which interest amounts to about $1,725,000. The interest payment is to be made from funds on hand.

Sugarland.—The state of Texas has lost its case against the Sugarland Railroad company for penalties amounting to $5,000 and a mandatory injunction to compel the road to rebuild a short branch which had been torn up and which the railroad claims would have cost $40,000 to construct and $10,000 annually to maintain, with practically no revenue. The case was filed in July, 1911, shortly before the company had extended its line from a point three miles from Arcola Junction to a point eighteen miles south of the connecting point of the International & Great Northern and the Santa Fe, leaving a spur 3½ miles long from the point of divergence of the extension to Arcola Junction. Permission was granted by the railroad commission to tear up the spur, but later the order was revoked, and the company was ordered to rebuild the track.

[ADVERTISEMENT.]

ANNUAL REPORTS.

THE ATCHISON, TOPEKA & SANTA FE RAILWAY SYSTEM.

SEPTEMBER 23, 1913.

To the Stockholders:

Your Directors submit the following report for the fiscal year July 1, 1912, to June 30, 1913, inclusive.

The Lines comprising the Atchison System, the operations of which are embraced in the following statements, are as follows:

	June 30, 1913.	June 30, 1912.
Atchison, Topeka & Santa Fe Railway	8,237.55 miles.	8,200.86 miles.
Rio Grande & El Paso Railroad	20.21 "	20.21 "
Gulf, Colorado & Santa Fe Railway	1,595.77 "	1,596.06 "
Pecos & Northern Texas Railway	481.79 "	478.67 "
Pecos River Railroad	54.24 "	54.24 "
Southern Kansas Railway of Texas	124.92 "	124.92 "
Texas & Gulf Railway	125.49 "	125.80 "
Gulf & Interstate Railway of Texas	71.33 "	71.97 "
Concho, San Saba & Llano Valley Railroad	60.15 "	60.15 "
	10,771.45 "	10,732.88 "

Increase during the year 38.57 miles.

The average mileage operated during the fiscal year ending June 30, 1913, was 10,750.31 miles, being an increase of 122.39 miles as compared with the average mileage operated during the preceding fiscal year.

In addition to lines covered by this report there were completed on June 30, 1913, 155.20 miles of additional line, of which 119.42 miles were ready for operation on July 1, 1913.

The Company also controls, through ownership of stocks and bonds, other lines aggregating 63.58 miles, and is interested jointly with other companies in 624.56 miles.

For detailed statement of present mileage and of changes in mileage since last Annual Report, see pages 42 to 46.

INCOME STATEMENT.

The following is a summary of the transactions of the System for the years ending June 30, 1912 and 1913:

	1912.	1913.
Operating Revenues	$107,752,359.91	$116,896,251.98
Operating Expenses	71,273,202.97	77,642,534.73
Net Operating Revenue	$36,479,156.94	$39,253,717.25
Taxes	4,206,453.85	4,662,152.38
Operating Income	$32,272,703.09	$34,591,564.87
Other Income	2,569,968.22	2,515,623.96
Gross Corporate Income	$34,842,671.31	$37,107,188.83
Rentals and Other Charges	1,521,570.56	1,128,129.10
	$33,321,100.75	$35,979,059.73
Interest on Bonds, including accrued interest on Adjustment Bonds	13,660,859.50	13,825,325.40
Net Corporate Income (representing amount available for dividends and surplus and for necessary but unproductive or only partially productive expenditures)	$19,660,241.25	$22,153,734.33

From the net corporate income for the year the following sums have been deducted:

DIVIDENDS ON PREFERRED STOCK—		
No. 29 (2½%) paid Feb. 1, 1913	$2,854,345.00	
No. 30 (2½%) paid Aug. 1, 1913	2,854,345.00	
	$5,708,690.00	
DIVIDENDS ON COMMON STOCK—		
No. 29 (1½%) paid Sept. 2, 1912	$2,559,097.50	
No. 30, (1½%) paid Dec. 2, 1912	2,586,052.50	
No. 31 (1½%) paid Mar. 1, 1913	2,613,562.50	
No. 32 (1½%) paid June 2, 1913	2,640,067.50	
	10,398,780.00	
Appropriation for Fuel Reserve Fund	461,105.11	
Appropriated for Additions and Betterments	5,574,433.63	
California-Arizona Lines Bonds Sinking Fund	10,725.59	
		$22,153,734.33
Surplus to credit of Profit and Loss June 30, 1912		$20,470,115.99
Additions to Profit and Loss Account (Sundry Adjustments applicable to prior years)		99,684.82
Surplus to credit of Profit and Loss June 30, 1913		$20,569,800.81

Income from sources other than earnings from operation consisted of interest on cash in banks and sums collected as interest and dividends upon bonds and stocks of companies, the operations of which are not included in the System accounts.

During the fiscal year the sum of $200,000 in cash was received as the net proceeds of sales of land embraced in the Santa Fe Pacific Land Grant, but this was directly written off the book value of Railroads, Franchises and Other Property, and the transaction does not appear in the Income Account.

CAPITAL EXPENDITURES AND REDUCTION OF BOOK VALUES.

The total charges to Capital Account, as shown by the General Balance Sheet, page 26, at June 30, 1913, aggregated $640,263,756.10 as compared with $621,869,989.29 at June 30, 1912, an increase during the year of $18,393,766.81, which analyzes as follows:

Construction and acquisition of new mileage, including the acquisition of bonds and stocks of other railway and terminal companies:		
Belt Ry. of Chicago	$ 240,000.00	
California, Arizona & Santa Fe Ry.	1,500.00	
Concho, San Saba & Llano Valley R. R.	11,982.64	
Denver Union Terminal Ry.	5,000.00	
Dodge City & Cimarron Valley Ry.	1,266,870.83	
Eastern Ry. of New Mexico	1,036,987.19	
Grand Canyon Ry.	36,806.36	
Gulf, Beaumont & Kansas City Ry.	99,094.90	
Minkler Southern Ry.	72,888.58	
Union Passenger Depot Co. of Galveston	95,000.00	
Western Arizona Ry.	26,842.33	
		$2,892,972.83
Additions and Betterments—System Lines:		
Right of Way, Station Grounds, and Real Estate	$ 294,013.21	
Widening Cuts and Fills, including Protection of Banks	519,480.20	
Grade Reductions and Changes of Line	240,467.85	
Bridges, Trestles and Culverts	506,956.83	
Ballast, including cost of spreading and putting under track	678,463.24	
Increased Weight of Rail	238,946.06	
Frogs, Switches, Track Fastenings, and Appurtenances	693,252.17	
Additional Main Tracks	3,143,627.06	
Sidings and Spur Tracks	720,910.62	
Terminal Yards	377,957.83	
Track Elevation, Elimination of Grade Crossings, and Improvements of Over and Under Grade Crossings	34,249.62	
Interlocking, Block and Other Signal Apparatus	343,806.78	
Telegraph and Telephone Lines	8,896.61	
Buildings, Shops, Dock and Wharf Property	1,494,374.47	
Shop Machinery and Tools	250,067.84	
Additional Equipment	9,502,718.09	
Betterments to Equipment	50,351.13	
Other Additions and Betterments	134,532.58	
		$19,233,072.19
Fuel Lands and Other Properties:		
Fuel Lands	$ 402,531.50	
Ice Plant, Belen	3,685.22	
Santa Barbara Tie & Pole Co.	23,208.98	
Real Estate held for future use	966,537.35	
Miscellaneous Items	82,200.72	
		$ 1,478,163.77
Other Investments		664,209.85
Total Charges		$24,268,418.64
Reduction of Book Values:		
Gulf, Beaumont & Kansas City Ry.	$ 99,000.00	
Gulf, Colorado & Santa Fe Ry.	38,649.59	
Santa Fe Pacific R. R.—Land Sales	200,000.00	
Sunset Ry.	30,069.77	
Ice Plant, San Bernardino	50,119.76	
Fuel Lands	1,811,531.50	
Tie and Timber Lands	36,613.30	
Reserve for Accrued Depreciation	3,608,667.91	
		$ 5,874,651.83
Net Increase in Capital Account during the year		$18,393,766.81

The item of $9,502,718.09 for "Additional Equipment" analyzes as follows:—

118 Locomotives		$ 3,105,306.39
52 Passenger-Train Cars		637,572.25
5,658 Frieght-Train Cars		6,437,040.76
470 Miscellaneous Cars		239,709.15
		$10,419,628.55
Less—Value of equipment retired during the year as follows:		
49 Locomotives	$217,288.27	
15 Passenger-Train Cars	52,215.48	
1,384 Freight-Train Cars	592,617.83	
16 Miscellaneous Cars	11,423.44	
1 Steam Boat	43,365.44	
		916,910.46
		$9,502,718.09

MAINTENANCE OF EQUIPMENT.

The following statement shows the sums charged to Operating Expenses for Maintenance of Equipment during each year since July 1, 1896:

Year Ending June 30.	Average Operated Mileage.	Total Expenditure.	Expenditure Per Mile.
1897	6,443.81	$3,443,884.82	$ 534.45
1898	6,936.02	4,659,277.99	671.75
1899	7,032.62	4,810,795.64	684.07
1900	7,341.34	5,267,832.40	717.56
1901	7,807.31	6,257,456.57	801.49
1902	7,855.38	7,864,951.25	1,001.22
1903	7,965.13	8,510,543.09	1,068.48
1904	8,179.59	10,006,135.41	1,223.31
1905	8,305.40	10,914,864.47	1,314.19
1906	8,433.99	10,720,040.43	1,271.05
1907	9,273.15	11,779,846.64	1,270.32
1908	9,415.01	14,246,621.44	1,513.18
1909	9,794.86	13,903,897.37	1,419.51
1910	9,916.33	15,560,047.44	1,569.13
1911	10,350.13	16,686,145.45	1,612.17
1912	10,627.92	16,521,231.41	1,554.51
1913	10,750.31	19,415,224.63	1,806.02

For the year ending June 30, 1913, maintenance charges, including renewals and depreciation, averaged as follows:

Per locomotive	$4,770.08
Per locomotive mile	.1772
Per passenger car, including mail and express	1,283.40
Per passenger car mile	.0141
Per freight car	114.92
Per freight car mile	.0104

The foregoing average maintenance charges include a proportion of unlocated expenditures for Maintenance of Equipment charged to Superintendence, Shop Machinery and Tools, Injuries to Persons, Stationery and Printing, Other Expenses, and Maintaining Joint Equipment at Terminals. Beer and refrigerator cars are not taken into consideration in arriving at the foregoing averages, such cars being operated by the Santa Fe Refrigerator Despatch Company, which bears the expense of their maintenance.

A statement of the locomotives in service and of their tractive power will be found on page 41.

MAINTENANCE OF WAY AND STRUCTURES.

The following statement shows the sums charged to Operating Expenses for Maintenance of Way and Structures during each year since July 1, 1896:

Year Ending June 30.	Average Operated Mileage.	Total Expenditure.	Expenditure Per Mile.
1897	6,443.81	$6,282,923.15	$ 975.03
1898	6,936.02	8,281,397.88	1,193.97
1899	7,032.62	7,672,107.62	1,090.93
1900	7,341.34	6,354,372.10	865.56
1901	7,807.31	6,433,840.36	824.08
1902	7,855.38	6,141,466.39	781.82
1903	7,965.13	9,304,892.04	1,168.20
1904	8,179.59	9,170,234.07	1,121.11
1905	8,305.40	11,385,418.33	1,370.85
1906	8,433.99	12,475,407.97	1,479.18
1907	9,273.15	15,286,062.66	1,648.42
1908	9,415.01	14,120,828.02	1,499.82
1909	9,794.86	12,884,406.81	1,315.43
1910	9,916.33	17,807,136.20	1,795.74
1911	10,350.13	16,059,786.90	1,551.65
1912	10,627.92	16,076,833.75	1,512.70
1913	10,750.31	18,054,413.03	1,679.43

COMPARISON OF OPERATING RESULTS.

The following is a statement of revenues and expenses of the System for the fiscal year ending June 30, 1913, in comparison with the previous year:

	Year Ending June 30, 1913.	Year Ending June 30, 1912.	Increase.
OPERATING REVENUES:			
Freight	$ 78,190,923.18	$ 71,529,574.67	$6,661,348.51
Passenger	29,425,922.44	27,453,525.41	1,972,397.03
Mail, Express and Miscellaneous	9,279,406.36	8,769,259.83	510,146.53
Total Operating Revenues	$116,896,251.98	$107,752,359.91	$9,143,892.07
OPERATING EXPENSES:			
Maintenance of Way and Structures	$ 18,054,413.03	$ 16,076,833.75	$1,977,579.28
Maintenance of Equipment	19,415,224.63	16,521,231.41	2,893,993.22
Traffic Expenses	2,455,784.69	2,416,746.46	39,038.23
Transportation Expenses	35,135,649.15	33,733,667.06	1,401,982.09
General Expenses	2,581,463.23	2,524,724.29	56,738.94
Total Operating Expenses	$ 77,642,534.73	$ 71,273,202.97	$6,369,331.76
Net Operating Revenue	$ 39,253,717.25	$ 36,479,156.94	$2,774,560.31
Ratio of Operating Expenses to Operating Revenues	66.42	66.15	.27

The following averages are deduced from tables set forth on pages 36 and 39.

The average tons of freight (revenue and company) per loaded car mile increased from 18.52 to 19.12, or 3.24 per cent.

The average tons of freight (revenue and company) carried per freight-train mile (freight, mixed and company-supply) increased from 399.94 to 425.41, or 6.37 per cent.

The average freight revenue per revenue freight-train mile increased from $3.26 to $3.48, or 6.75 per cent.

The average passenger revenue per revenue passenger-train mile increased from $1.18 to $1.24, or 5.08 per cent.

The average passenger-train revenue per revenue passenger-train mile increased from $1.47 to $1.54, or 4.76 per cent.

The tons of freight carried one mile (revenue and company) increased 803,362,748, or 9.03 per cent., while miles run by freight cars (loaded and empty) in freight, mixed and company-supply trains increased 37,223,924, or 5.49 per cent., and the mileage of such trains increased 557,001, or 2.50 per cent.

The number of passengers carried one mile increased 50,692,714, or 3.98 per cent., while miles run by passenger cars in passenger and mixed trains increased 3,691,588, or 2.68 per cent., and the mileage of such trains increased 428,699, or 1.84 per cent.

The following is a consolidated statement of the business of the System for each fiscal year during the period since January 1, 1896:

Fiscal Year Ending June 30.	Average Miles Operated.	Gross Revenues, Including Income from Other Sources.	Expenses, Including Taxes, Rentals and Other Charges.	Interest on Bonds.	Net Corporate Income.
1897 (18 mos.)	6,443.81	$44,532,628.99	$36,038,455.30	$8,440,387.91	$ 53,785.78
1898	6,936.02	39,396,126.41	30,513,553.17	7,045,988.30	1,836,584.94
1899	7,032.62	40,762,933.47	29,332,964.11	7,241,972.00	4,187,997.36
1900	7,341.34	46,498,899.04	29,414,427.56	7,345,166.50	9,739,304.98
1901	7,807.31	54,807,379.78	34,502,039.87	7,830,810.83	12,474,529.08
1902	7,855.38	60,275,944.33	36,272,432.45	8,438,985.00	15,564,526.88
1903	7,965.13	63,668,390.99	40,635,576.48	9,134,485.24	13,898,329.27
1904	8,179.59	69,419,975.41	44,641,434.10	9,418,770.00	15,359,771.31
1905	8,305.40	69,189,739.65	47,835,883.50	9,611,510.09	11,742,346.06
1906	8,433.99	79,390,749.05	51,035,355.71	10,622,184.22	17,733,209.12
1907	9,273.15	94,436,574.68	61,779,916.16	11,487,934.70	21,168,723.82
1908	9,415.01	91,289,770.61	65,031,582.67	12,579,301.77	13,678,886.17
1909	9,794.86	95,424,091.89	61,458,019.13	13,548,081.93	20,417,990.83
1910	9,916.33	107,543,250.16	75,133,314.54	11,984,151.36	20,425,784.26
1911	10,350.13	109,772,481.69	75,689,094.83	12,712,319.31	21,371,067.55
1912	10,627.92	110,322,328.13	77,001,227.38	13,660,859.50	19,660,241.25
1913	10,750.31	119,411,875.94	83,432,816.21	13,825,325.40	22,153,734.33

The following statement shows the gross operating revenues of the System (exclusive of income from other sources) per mile of road operated for each fiscal year since July 1, 1896:

Year ending June 30.	Gross Operating Revenues.	Average per Mile of Road.
1897	$ 30,621,230.10	$ 4,752.04
1898	39,214,099.24	5,653.69
1899	40,513,498.63	5,760.80
1900	46,232,078.23	6,297.49
1901	54,474,822.61	6,977.41
1902	59,135,085.53	7,527.97
1903	62,350,397.28	7,827.92
1904	68,171,200.18	8,334.31
1905	68,375,837.25	8,232.70
1906	78,044,347.25	9,253.55
1907	93,683,406.91	10,102.65
1908	90,617,796.38	9,624.82
1909	94,265,716.87	9,624.00
1910	104,993,194.67	10,587.91
1911	107,565,115.62	10,392.63
1912	107,752,359.91	10,138.61
1913	116,896,251.98	10,873.75

The following statement shows the development of the freight and passenger revenues of the System since July 1, 1896:

Year ending June 30.	Freight Revenue.	Passenger Revenue.
1897	$22,067,686.77	$ 5,574,288.31
1898	28,588,716.76	7,347,361.59
1899	29,492,586.65	8,126,141.85
1900	33,729,332.83	9,334,661.57
1901	39,052,557.43	11,678,017.25
1902	41,815,607.05	13,439,384.57
1903	44,622,438.71	13,469,985.78
1904	47,762,653.23	15,433,773.63
1905	47,408,982.36	16,045,380.27
1906	54,598,902.82	18,013,988.56
1907	65,500,309.42	21,171,629.08
1908	61,848,638.51	21,643,427.49
1909	64,212,638.10	22,734,505.32
1910	71,194,055.59	25,437,181.98
1911	71,787,200.89	27,204,867.66
1912	71,529,574.67	27,453,525.41
1913	78,190,923.18	29,425,922.44

PROPERTY INVESTMENT AND RATE OF RETURN.

The growth of the business of your Company indicated by the foregoing three statements, and also the increased efficiency suggested by the averages immediately preceding those statements, are due principally to the very large expenditures (over $270,000,000) which have been made in the extension and improvements of the property since January 1, 1896. In order to make such expenditures your Company has raised since 1896 over $217,000,000 of "new money" by the sale of bonds which are now outstanding or which (in the case of many of the convertible bonds issued) are represented by common stock now outstanding. The following statement shows, for each year, the amount of investment, the amount of net income applicable to bond interest, dividends, improvement of property and strengthening of credit, and the rate of return which such net income represents on the amount of the investment.

Year Ending June 30th.	Property Investment.*	Income Applicable to Bond Interest, Dividends, Improvement of Property and Strengthening of Credit.†	Per Cent. Income of Property Investment.
1896 (6 months)	$372,104,262.77	$ 2,432,870.06	.65
1897	387,957,477.68	6,070,364.45	1.57
1898	392,169,842.02	8,871,947.26	2.26
1899	399,527,444.30	11,409,315.36	2.86
1900	407,187,811.22	17,064,850.91	4.19
1901	419,541,440.17	21,196,714.38	5.05
1902	439,911,035.33	23,921,018.14	5.44
1903	454,290,057.89	23,032,814.51	5.07
1904	466,273,139.34	24,778,541.31	5.31
1905	473,020,998.79	21,353,856.15	4.51
1906	496,782,342.35	28,355,393.34	5.71
1907	519,004,129.48	32,724,274.07	6.31
1908	541,727,328.96	25,633,510.34	4.73
1909	548,251,270.97	33,523,437.28	6.11
1910	579,793,768.23	32,387,712.39	5.58
1911	609,287,764.18	34,102,511.86	5.59
1912	621,869,989.29	33,321,100.75	5.36
1913	640,263,756.10	36,086,013.36	5.64
Annual Average	$487,164,658.84	$23,786,642.62	4.88

*The amounts above shown as "Property Investment" do not include anything for necessary working capital such as materials and supplies and cash. Ordinarily such necessary working capital considerably exceeds $35,000,000.

In the years 1901 to 1908 the "Property Investment" was reduced by "writing off" sums aggregating $21,066,685.78, which sums are excluded from the "Property Investment" as above stated.

In the years 1910 to 1913 sums aggregating $16,077,421.48, consisting of depreciation of equipment accrued pursuant to the ruling of the Interstate Commerce Commission, have been deducted from the amount shown as "Property Investment" and are excluded in the above statement.

†The "Income" shown above is determined after allowing for adjustments made through profit and loss.

The last statement emphasizes the striking fact that the earnings on the entire investment are now not much in excess of five per cent. per annum and continue on that basis notwithstanding the increase in efficiency and the increase in the volume of traffic. It may be explained that the ability of your Company under such circumstances to pay six per cent. on the common stock is due to the fact that it pays an average of substantially less than five per cent. on its bonded debt, and, indeed, much of the bonded debt was created when money could be borrowed at or near four per cent.

The very moderate return which is realized upon the investment, especially when considered in connection with the increased rates which must now be paid for new capital, indicates that in order to preserve and strengthen the credit of even the most successful railroad companies, to the end that they may be able to develop and improve their property so as to promote the public safety and the public convenience, the Government ought to increase, rather than to reduce still further, the rates for transportation and ought to be exceedingly slow about increasing still further the costs of operation. It is very clear from the foregoing statement that the mere growth of business and the mere increase in efficiency will not afford adequate protection against further reduction in rates for transportation and further increases in costs, especially in view of the increasing rates demanded for the use of money.

CAPITAL STOCK AND FUNDED DEBT.

The outstanding Capital Stock (deducting stock in treasury) on June 30, 1912, consisted of:

Common	$170,129,500.00	
Preferred	114,173,730.00	
		$284,303,230.00

Issued during the year:		
Common Stock issued in exchange for Convertible Bonds retired		20,707,000.00
Capital Stock outstanding June 30, 1913:		
Common	$190,836,500.00	
Preferred	114,173,730.00	
		$305,010,230.00

The outstanding Funded Debt of the System (deducting bonds in the treasury) amounted on June 30, 1912, to..... $342,645,015.00

The following changes in the Funded Debt occurred during the year:

Obligations Purchased or Retired:

Serial Debenture 4% Bonds,		
Series K	$ 785,000.00	
Series L	1,903,000.00	
Convertible 4% Bonds	14,241,000.00	
Convertible 5% Bonds	6,466,000.00	
California-Arizona Lines First and Refunding Mortgage 4½% Bonds	4,866.50	
Miscellaneous Divisional Bonds	99,000.00	
		23,498,866.50
Total System Funded Debt outstanding June 30, 1913.....		$319,146,148.50

Interest charges for the year ending June 30, 1914, will be approximately $12,900,000, or an average monthly charge of about $1,075,000. In making this approximation, exchanges of Convertible Bonds for Common Stock made since June 30, 1913, aggregating $3,574,000, are considered.

TREASURY.

Neither this Company nor any of its auxiliaries has any notes or bills outstanding.

The Company held in its treasury on June 30, 1913, $30,096,205.59 cash, and had available $3,780,000 General Mortgage Bonds, including bonds not yet certified by the Trustee. The Company also has in the treasury unpledged a large amount of stocks and bonds of other companies, of which part are carried in the balance sheet as Investments and part are included under Railroads, Franchises and Other Property.

FUEL RESERVE FUND.

The fund has been increased during the year by earnings derived from sundry fuel properties, and decreased by certain payments for fuel properties, as follows:

Amount to credit of Fund June 30, 1912	$1,827,272.58
Added during the year	461,105.11
	$2,288,377.69
Deduct sums paid for fuel properties	561,531.50
In Fund June 30, 1913	$1,726,846.19

DODGE CITY AND CIMARRON VALLEY RAILWAY.

This line, which was under construction at the date of last annual report, extending from Dodge City, Kansas, in a southwesterly direction to Elkhart, Kansas, a distance of about 120 miles, was completed during the year. The operation of the new line by your company as a part of its System began on July 1, 1913, under lease of that date.

MINKLER SOUTHERN RAILWAY COMPANY.

This company was formed to construct certain new lines through rich orchard country in the San Joaquin Valley of California. Of the projected lines about 40 miles, between Wahtoke, Cutler and Exeter, are now under construction.

WEST TEXAS CONSTRUCTION.

The lines in West Texas, the construction of which was commenced in 1909, and reference to which was made in the annual reports for that and subsequent years, are completed, with the exception of the extension of the Coleman-Lubbock line from Lubbock, Texas, to Texico, New Mexico. This extension, 89 miles in length, is about three-quarters completed and will probably be fully opened for business about January 1, 1914.

VERDE VALLEY RAILWAY.

During the year this line, extending from Cedar Glade to Clarkdale, Arizona, a distance of about 38 miles, has been completed. The line is operated by your Company under lease and was opened for traffic February 1, 1913.

NORTHWESTERN PACIFIC RAILROAD.

The construction of the line of this company (whose capital stock is owned, one-half by your Company and one-half by the Southern Pacific Company, between Willetts and Shively, California, referred to in the last annual report, has been actively prosecuted throughout the year, 24.95 miles having been completed, leaving only 41.20 miles still to be constructed. The construction of this line involves very heavy work through a mountainous country, so that progress is necessarily slow; however, a large amount of grading for the remaining mileage has already been done and the work will be pushed to completion as rapidly as conditions permit.

UNION PASSENGER STATION, KANSAS CITY.

A new passenger station and extensive passenger facilities at Kansas City are nearing completion, and will probably be opened for use before the expiration of this fiscal year; the terminal is to be used by all the roads entering Kansas City and is one of the most complete passenger terminals in the country as well as one of the most expensive, owing to local topography and other conditions. The use of the new facilities will be an enormous convenience to the public and will entail a large expense on the part of the railroads. On the other hand the conditions at the old station had become intolerable to both parties.

THE BELT RAILWAY OF CHICAGO.

During the year your Company acquired an interest in the Belt Railway of Chicago, the capital stock of which was increased so as to permit of ownership in equal parts by twelve of the railway companies entering Chicago, all of which have paid in cash at par for the stock acquired by them. The Belt Company leases from the Chicago & Western Indiana Railroad Company what is known as the Belt Division of that company's property, comprising about 21 miles of main line and branches, and also the freight distributing or clearing yard and facilities formerly owned by the Chicago Union Transfer Railway Company, which was acquired by the Chicago & Western Indiana Railroad Company as of September 2, 1912. The lease in question is dated November 1, 1912, and runs until September 1, 1962, with option of purchase at the expiration of that period. The enlargement of this company and the revival of the freight clearing yard will tend to facilitate materially the interchange of freight traffic between all railways entering Chicago.

ADDITIONAL MAIN TRACK MILEAGE.

The mileage of second track in operation on June 30, 1913, was 898.32 miles as compared with 801.90 miles at the close of the preceding fiscal year, being an increase of 96.42 miles.

Second Track Work in Progress.

Missouri Division:		
Floyd to Sibley, Mo	3.63	miles.
Lines West of Albuquerque:		
Rito to Laguna, N. M	9.16	"
Cactus to Flagstaff, Ariz	43.32	"
Ash Fork to Pan, Ariz	22.55	"
Summit to Keenbrook, Cal	10.69	"
Total	89.35	"

It is expected that all the second track work in progress will be completed by January 1st next, making a total on that date of 987.67 miles of second track in operation.

RECENT DECISIONS IN STATE RATE CASES.

Pursuant to the recent decision of the United States Supreme Court in the Missouri Rate Cases, your Company put into effect in that State the 2-cent passenger fare as well as the reduced freight rates, but the tariffs covering this rates have been filed under protest. In Oklahoma, where the order of the United States Circuit Court for the Western District of that State, restraining the enforcement of the 2-cent provision of the State Constitution, had not been seriously opposed pending the outcome of the other State rate cases before the United States Supreme Court, the 2-cent fare was re-established July 3, 1913. The case, however, by mutual consent is being held open for a reasonable period to enable your Company and other interested carriers to re-construct their case, as far as possible within the limitations laid down in the Supreme Court decisions in the Minnesota and other State rate cases.

The compilation of statistics indicating the confiscatory nature of these low rates is now in progress and upon its completion these cases in which your Company is interested will, it is expected, be carried to a final adjudication.

TAXES.

In the last annual report attention was called to the steadily increasing burden of taxation, and a table was submitted showing that the percentage of increase in taxation during the five years ending June 30, 1912, was slightly over 68 per cent. There has been no diminution of this burden during the fiscal year covered by this report, but on the contrary, the increase has continued, the taxes for the year aggregating $4,662,152.38. This sum is equivalent to 11.8 per cent. of the operating income for the year and exceeds the taxes of the preceding year to the extent of 10.8 per cent.

During the year the Company suffered the loss of Mr. Geo. T. Nicholson, Vice-President, who died in Los Angeles, March 30, 1913. Mr. Nicholson had been in the service of the Company almost continuously for thirty years. He was a man of ripe judgment and fine executive ability, and moreover was of an engaging personality and much beloved by all of his associates.

Your Directors again take pleasure in recording their appreciation of the loyal and efficient service rendered by officers and employes.

EDWARD P. RIPLEY,
President.

ANNUAL REPORT OF THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE RAILWAY CO.

Including Chicago Division (Wisconsin Central)

FOR THE FISCAL YEAR ENDED JUNE 30, 1913.

Herewith is submitted report for the Fiscal Year ended June 30, 1913. The Gross Earnings, Expenses, Fixed Charges and Surplus Income are shown in condensed form as follows:

	Soo Line	Chicago Division	Soo Line System
Gross Earnings	$21,410,672.03	$10,893,990.47	$32,304,662.50
Operating expenses	12,096,214.80	7,208,299.24	19,304,514.04
Net earnings	$9,314,457.23	$3,685,691.23	$13,000,148.46
Income from other sources	871,051.19	49,038.70	920,089.89
Total income	$10,185,508.42	$3,734,729.93	$13,920,238.35
Fixed charges, taxes, etc	4,658,092.94	2,641,379.47	7,299,472.41
Surplus income	$5,527,415.48	$1,093,350.46	$6,620,765.94

The substantial increase in the Company's Gross Earnings, while partially due to the unusual grain crop of 1912, reflects also the growth and general prosperity of the Northwest, including the Canadian Northwest and the settlement of the territory adjacent to the Company's lines. Three years since, the Soo Line built a line into the so-called Cuyuna Iron Range, located in Aitkin and Crow Wing counties, Minnesota. A dock was built at Superior, Wisconsin, to handle ore from this range to Lake vessels. The first shipments were made in 1912 and aggregated about three hundred thousand tons. This season's shipments will be approximately one million tons and next season, unless the iron industry is seriously disturbed, three million tons are expected. It is doubtful if any Iron Range has shown a more rapid development.

The Company has in course of construction at this time, eighty-five miles of additional main track extending from Ambrose, N. D., west, which will be completed in time to move this season's crop. Additional mileage at this time is not contemplated and will not be until improved financial conditions prevail, or the attitude of the public as expressed through its various avenues of political activities assures more reasonable treatment of transportation companies.

Construction of freight terminals in the city of Chicago is progressing

ANNUAL REPORT OF THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE RAILWAY CO.

Including Chicago Division (Wisconsin Central)

satisfactorily and will be completed by January 1, 1914. Funds for the construction of this terminal were fully provided at the initiation of the project. The completed property will be equal, if not superior, to any freight terminal of its size in Chicago.

During the year, at a cost of $240,000.00, this Company acquired twenty-four hundred shares of the Belt Railway Company of Chicago, thus placing it on a parity with the twelve other lines interested in that Company. The Belt Railway Company operates extensive switching lines in the city of Chicago. The advantages of thus securing direct connection with the numerous industries adjacent to the Belt Company's tracks are obvious.

The consistent growth of the Company's business and the more rigid exactions of the public for improved facilities and safety devices require from year to year larger expenditures for additions and betterments to the property, expansion of its shop facilities and liberal additions to its equipment. Over one million two hundred thousand dollars were expended during the year for additions and betterments. Extensive additions at the principal shops, located at Shoreham, are in progress.

By means of an Equipment Trust arrangement aggregating $3,806,657.19, issued January 1st, 1913, the equipment was increased to the extent of 25 Locomotives, 49 Steel Passenger Cars of various classes, 1,700 Freight Cars, 300 Ore Cars, 20 Caboose Cars and 200 Ballast Cars. In accordance with the Company's well established policy, its property and equipment has been maintained to yield its full working efficiency.

General conditions which obtain throughout the Northwest at this time seem to assure a satisfactory tonnage during the current year.

Respectfully submitted,

E. PENNINGTON,
President.

GENERAL BALANCE SHEET, JUNE 30, 1913.

ASSETS.

Property Investment:		
Road	$92,213,209.26	
Equipment	20,519,163.23	
	$112,732,372.49	
Less Reserve for Accrued Depreciation	1,592,246.03	
Total		$111,140,126.46
Securities of Proprietary, Affiliated and Controlled Companies:		
Wisconsin Central Ry. Co. Stock	$3,658,337.09	
St. Paul Union Depot Co. Stock	103,600.00	
Minnesota Transfer Ry. Co. Stock	7,000.00	
Sault Ste. Marie Bridge Co. Stock	500.00	
Sault Ste. Marie U. D. Co. Stock	50,590.56	
Central Terminal Ry. Co. Stock	900,000.00	
Belt Ry. Co. of Chicago Capital Stock	240,000.00	
Central Terminal Ry. Co. Bonds	139,500.00	
Minnesota Transfer Ry. Co. Bonds	59,000.00	
Total		5,158,527.65
Other Investments:		
Miscellaneous Investments:		
Tri-State Land Company Stock	$25,000.00	
Western Express Company Stock	50,000.00	
Coeur d'Alene & Pend d'Oreille. Ry. Co. 5% Bonds	25,200.00	
W. C. Ry. Co. Equipment Contract	630,129.60	
Miscellaneous Stock	151.00	
Total		730,480.60
Working Assets:		
Cash	$3,357,524.54	
Securities in Treasury:		
First Consolidated Mortgage M. St. P. & S. S. M. Ry. Co. 4% Bonds	2,691,000.00	
Pillsbury-Washburn Flour Milling Co., Ltd., 5% Bonds	4,700.00	
Village of Alexandria Bonds	4,000.00	
Traffic and Car Service Balances due from other companies	413,041.89	
Net Balances due from Agents and Conductors	1,215,871.40	
Misc. Accounts & Bills Receivable	889,481.04	
Material and Supplies	3,399,180.09	
Total		11,974,798.96
Accrued Income Not Due:		
Unmatured Dividends	$111,690.00	
Unmatured Interest	12,261.11	
Total		123,951.11
Deferred Debit Items:		
Central Terminal Ry. Co	$248,341.07	
Tri-State Land Co	1,530,338.77	
Land Sales (Deferred Payments)	120,000.00	
Special Deposits for Equipment, etc	908,934.49	
Other Deferred Debit Items	51,043.83	
Working Funds	127,544.78	
Unextinguished Discount on Securities	372,395.20	
Total		3,358,598.14
Grand Total		$132,486,482.92

LIABILITIES.

Capital Stock:		
Common	$25,206,800.00	
Preferred	12,603,400.00	
Total		$37,810,200.00
Mortgage, Bonded and Secured Debt:		
First Mortgage M. & P. Ry. Co. 4% Bonds	$286,000.00	
First Mortgage M. S. S. M. & Atl. Ry. Co. 4% Bonds	8,136,000.00	
First Consolidated Mortgage M. St. P. & S. S. M. Ry. Co. 4% Bonds	54,916,000.00	
Second Mortgage M. St. P. & S. S. M. Ry. Co. 4% Bonds	3,500,000.00	
Equipment Trust Obligations	6,695,000.00	
Total		73,533,000.00
Working Liabilities:		
Traffic and Car Service Balances due to Other Companies	$186,527.18	
Audited Vouchers & Wages Unpaid	3,863,275.20	
Miscellaneous Accounts Payable	264,330.07	
Matured Interest and Dividends Unpaid	1,308,197.00	
Total		5,622,329.45
Accrued Liabilities Not Due:		
Unmatured Interest	$139,140.00	
Taxes Accrued	609,366.05	
Total		748,506.05
Deferred Credit Items:		
Operating Reserve	$213,314.34	
Other Deferred Credit Items	90,664.86	
Total		303,979.20
Profit and Loss		14,468,468.22
Grand Total		$132,486,482.92

Contingent Liabilities:

As joint maker with the Central Terminal Railway Company of Illinois of Bonds secured by mortgage on property of the Central Terminal Railway Company	$ 6,000,000.00
4% Leased Line Certificates of the Minneapolis, St. Paul & Sault Ste. Marie Railway Company, issued in exchange for Preferred Stock of the Wisconsin Central Railway Company, held therefor	$ 11,169,000.00

OPERATING REVENUES AND EXPENSES.

Revenue from Transportation:		
Freight Revenue	$15,330,648.06	
Passenger Revenue	4,564,256.51	
Excess Baggage Revenue	47,611.80	
Mail Revenue	370,353.10	
Express Revenue	370,762.14	
Other Passenger Train Revenue	2,244.76	
Switching Revenue	57,327.57	
Special Service Train Revenue	8,400.49	
Miscellaneous Transportation Revenue	18,484.53	
Total Revenue from Transportation		$20,770,088.96
Revenue from Operations Other than Transportation:		
Station and Train Privileges	$16,926.53	
Parcel Room Receipts	1,355.95	
Storage, Freight	1,427.30	
Storage, Baggage	1,840.02	
Car Service	33,018.96	
Telegraph Service	89,698.59	
Rents of Buildings and Other Property	39,073.20	
Miscellaneous	4,658.03	
Total Revenue from Operations Other than Transportation		$ 187,998.58
Joint Facilities Revenue		10,466.81
Total Operating Revenues		$20,968,554.35
Operating Expenses:		
Maintenance of Way and Structures	$2,292,992.97	
Maintenance of Equipment	2,603,668.64	
Traffic Expenses	357,518.43	
Transportation Expenses	6,090,410.90	
General Expenses	458,418.33	
Total Operating Expenses		$11,803,009.27
Net Operating Revenue		$ 9,165,545.08

INCOME ACCOUNT, FISCAL YEAR ENDED JUNE 30, 1913.

Net Operating Revenue		$ 9,165,545.08
Outside Operations:		
Revenues	$ 442,117.68	
Expenses	293,205.53	
Net Revenue from Outside Operations		148,912.15
Total Net Revenue		$ 9,314,457.23
Taxes Accrued		1,298,967.59
Operating Income		$ 8,015,489.64
Other Income:		
Dividends on Stock Owned	$ 458,621.00	
Hire of Equipment	148,335.07	
Interest and Discount	150,133.58	
Rents Receivable	69,127.37	
Interest on W. C. Ry. Equipment Contract	34,732.51	
Interest on Bonds Owned	10,101.66	
Total Other Income		871,051.19
Gross Corporate Income		$ 8,886,540.83
Deductions from Gross Corporate Income:		
Interest on Bonds	$2,506,280.00	
Interest on W. C. Ry. Leased Line Certificates	445,824.00	
Interest on Equipment Notes	244,095.00	
Rental of Terminals	162,926.35	
Total Deductions from Gross Corporate Income		3,359,125.35
Net Corporate Income		$ 5,527,415.48

PROFIT AND LOSS ACCOUNT TO JUNE 30, 1913.

By Balance June 30, 1912		$11,707,346.06
Net Corporate Income for the Year Ended June 30, 1913		5,527,415.48
		$17,234,761.54
Deductions for Year:		
7 per cent Dividend on Preferred Stock	$ 882,238.00	
7 per cent Dividend on Common Stock	1,764,476.00	
Extinguishment of Discount on Bonds and Car Trust Notes	20,374.34	
Equipment Depreciation Prior to July 1, 1907	25,752.91	
Items Transferred to General Balance Sheet Accounts; Premiums on Stock, Discount on Bonds and Charges to Operating Reserve, per I. C. C. Classifications	73,452.07	
		2,766,293.32
Balance Credit June 30, 1913		$14,468,468.22

TRAFFIC AND MILEAGE STATISTICS, AS PER INTERSTATE COMMERCE COMMISSION CLASSIFICATION.

	1913. Passengers, Tonnage, Rates and Revenues.	1912. Passengers, Tonnage, Rates and Revenues.
Passenger Traffic:		
Number of Passengers Carried Earning Revenue	2,248,502	1,930,486
Number of Passengers Carried One Mile	198,188,238	168,920,156
Number of Passengers Carried One Mile per Mile of Road	67,978	61,635
Average Distance Carried, Miles	88.14	87.50
Total Passenger Revenue	$4,564,256.51	$3,872,487.90
Average Amount Received from Each Passenger	$2.02991	$2.00597
Average Receipts per Passenger per Mile	$.02303	$.02292
Total Passenger Service Train Revenue	$5,355,228.31	$4,592,504.63
Passenger Service Train Revenue per Mile of Road	$1,836.84	$1,675.71
Passenger Service Train Revenue per Train Mile	$1.44163	$1.31638
Freight Traffic:		
Number of Tons Carried of Freight Earning Revenue	7,761,407	6,200,764
Number of Tons Carried One Mile	2,072,932,191	1,652,831,716
Number of Tons Carried One Mile per Mile of Road	711,014	603,085
Average Distance Haul of One Ton, Miles	267.08	266.55
Total Freight Revenue	$15,330,648.06	$11,934,791.52
Average Amount Received for Each Ton of Freight	$1.97524	$1.92473
Average Receipts per Ton per Mile	$.00740	$.00722
Freight Revenue per Mile of Road	$5,258.40	$4,354.76
Freight Revenue per Train Mile	$3.11885	$2.85583
Total Traffic:		
Operating Revenues	$20,968,554.35	$16,770,699.79
Operating Revenues per Mile of Road	$7,192.19	$6,119.28
Operating Revenues per Train Mile	$2.52830	$2.29596
Operating Expenses	$11,803,009.27	$9,342,443.87
Operating Expenses per Mile of Road	$4,048.42	$3,408.86
Operating Expenses per Train Mile	$1.42316	$1.27901
Net Operating Revenue	$9,165,545.08	$7,428,255.92
Net Operating Revenue per Mile of Road	$3,143.77	$2,710.42